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Original Communications

THE APOSTLE OF CASUISTRY IN MEDICINE

AN IDEALIZATION OF THEOPHILUS PARVIN

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(Presidential Address, The American Association of Obstetricians, Gynecologists, and Abdominal Surgeons, Thirty-ninth Annual Meeting, 1926)

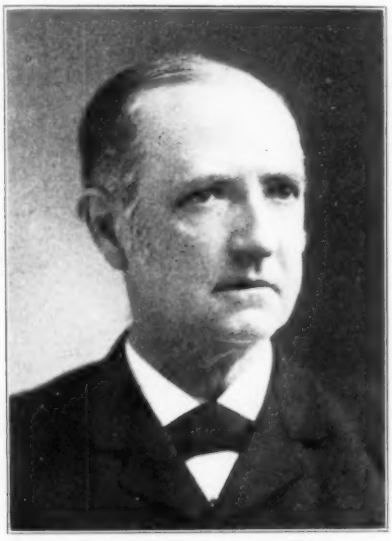
TO THE youth who first essays his entrance into the practice of any branch of medical science ever comes the vision of some one man, an outstanding character and an influence, which has to do with his future career. Such an impression was made upon me, while a neophite in physics by Theophilus Parvin, who was, in my student days, at the zenith of his career as a teacher.

Theophilus Parvin stood out as a classicist and a philosopher as well as a teacher and an operator. His imprint endures through medical history because he touched upon so many subjects, and with such brilliant skill, that his conclusions must be preserved for all time in our literature.

One needs select carefully the small number of the world's obstetricians whose names are to be mentioned with his; John Hunter, Meigs, Playfair, Tarnier, Madame La Chapelle, Von Winckel, Simpson and Blundell. To include those of the present day would invite invidious comparison.

No man in either hemisphere has been more widely recognized for his contributions to the subject of obstetrics than Theophilus Parvin. A glance at the Index Catalogue of the Surgeon General's office will reveal the vast energy and industrious application of the student and the investigator anxious to share the treasures of his discoveries with his brother practitioners. Dr. Parvin left a deep impression on every group that he met.

It is an interesting fact that in each of the teaching centers where Parvin was formerly the presiding genius, the present professors are Fellows of this Association: in Indianapolis Dr. Pfaff, Dr. Pantzer, Dr. Edward Clark, and Dr. Mendenhall; in Louisville Dr. Frank and Dr. Speidel; in Cincinnati Dr. Bonifield, Dr. Tate, and Dr. Hall; and in Philadelphia our newly-welcomed Fellow Dr. Brooke Bland. Many interesting letters have been received from these Fellows in answer to inquiries regarding Dr. Parvin's history and his work; and in addition it is fitting to mention Dr. Wm. M. Wishard of Indianapolis, and Mrs. James P. Baker, the only daughter of Dr. Parvin, who have furnished facts and anecdotes concerning his career. It is regretted



THEOPHILUS PARVIN
The Apostle of Casuistry

that these letters cannot all be included. This grateful acknowledgment is made to all our friends for the assistance they have afforded.

Theophilus Parvin was born in 1829 in Buenos Aires, South America, where his father the Rev. Theophilus Parvin was stationed as a missionary. His mother was the daughter of Caesar Augustus Rodney, who was Attorney General of the United States under Jefferson and Madison. She died when he was two weeks old, and the father brought his child back to this country but he died when young Theophilus was seven years old. Parvin entered Lafayette College at the age of twelve, and finished his academic career in the University of Indiana in 1847. He studied Hebrew and Greek at Princeton; received his Master's degree in 1850, and his M.D. from the University of Pennsylvania in 1852. He spent two years as surgeon on a packet line sailing between Philadelphia and Liverpool. Parvin then

successively filled the chair of Materia Medica, in Ohio Medical College, 1855 to 1864, and that of Obstetrics and Diseases of Women, University of Louisville to 1869. In 1876 he became Professor of Obstetrics in the College of Physicians and Surgeons in Indianapolis. In 1882 he was recalled to the University of Louisville and in 1883 accepted the chair of Obstetrics and Diseases of Women in Jefferson, also being obstetrician in the Philadelphia Hospital. He was co-editor, with Roberts Bartholow, of the *Cincinnati Journal of Medicine*, 1866-67; editor of the *Western Journal of Medicine*, 1868-69; and co-editor, with Yandell, of the *American Practitioner*, Louisville, 1869-83. In going over the bibliography one is struck by the myriad of medical contributions and the varied topics upon which Parvin wrote, always in an entertaining and most illuminating style.

His textbook, the *Science and Art of Obstetrics*, which ran rapidly through several editions, was one of the three big favorites of the colleges in the 80's; the other two being Lusk and Playfair. Parvin translated the *Diseases of Women* by Von Winckel, and was a contributor to Ashurst's *Encyclopedia of Surgery*, Sajous' *Universal Medical Sciences*, *The American Text Book of Obstetrics*, and the *American Text Book of Therapeutics*. He was successively elected president of the State Medical Society of Indiana, the American Medical Association, the American Medical Editor's Association, the American Academy of Medicine, the Philadelphia Obstetrical Society, and various other national societies. In 1890 he was president of the Obstetrical Section of the International Medical Congress, held in Berlin, where I first met him, toward the close of his memorable career. In 1892 he presided at the International Congress of Obstetrics, in Brussels. A long list of honorary fellowships in foreign societies is attached to his name.

The preserved contributions to current medical literature, including over one hundred and fifty titles, do not comprise all his writings. He must be classed as one of the great men who have illumined the medical profession with their intellectual attainments. His vigorous, well chosen English was a delight. His classical allusions were always apt. Parvin was the embodiment of the erudition which permeated all his writings throughout the thirty years of active professional and teaching career, 1868-1898. Dr. Wm. H. Parish, who wrote Parvin's obituary for the *Journal of the American Medical Association*, said: "Theophilus Parvin's career as the master obstetrician of America is familiar to the medical profession. During the last quarter of the nineteenth century he ranked, undoubtedly, among the great living authorities in medicine." His classical textbook in obstetrics, which was enthusiastically received by the profession, occupied the same position among obstetric books, that Samuel D. Gross' monumental work did among surgical books; that Sir Thomas Watson

and Trousseau did in medicine and Roberts Bartholow's *Materia Medica* did on the subject of therapeutics.

Dr. Parvin established, in 1889, the first maternity department of any hospital in America, at Jefferson College, following the method of Professor Winckel at Munich. Thirty-four confinements, without a maternal death, were attended and in the out-patient department 151 cases were cared for with but one death, cause unknown.

In making a report of this enterprise before the New York Academy of Medicine, Parvin appealed to the Academy as the organization which should, by promoting the establishment of this system of clinical obstetrics as a part of the regular curriculum in the medical schools of the country, set a light to guide the profession of America. In view of the importance of the proposed reform, he urged that every college which refused to take this step should be condemned to perish by common condign condemnation. Strange as it may seem, we are today appealing, without any penalizing, to the colleges to institute this same reform in the teaching of obstetrics.

Parvin's initiatory work blazed the trail for us, and in the best medical schools today obstetrics is appreciated as one of the major branches of instruction. It will be remembered, however, that Dr. Rowland's investigation, reported to the American Medical Association last year, showed that, as compared with surgery, obstetrics in the last two years of the course in the average medical school is assigned four hours a week, while surgery has eighteen hours.

Parvin's discussions were always dignified, considerate and courteous, even when he disagreed with his confreres. One is struck with an instance of this published in the *Report of the Proceedings of the Philadelphia Obstetrical Society*.

Dr. Parvin had brought back from Europe an axis-traction forceps, which he exhibited to the Society. In the discussion which followed, Dr. William Goodell, gynecologist of Parvin's alma mater, the University of Pennsylvania, said he did not have much interest in the new fangled axis-traction principle, then being advanced by Tarnier in Paris and Simpson in Edinburgh. He said that he had often suffered backache during a high forceps delivery, until he devised an apparatus of his own, which he proceeded to illustrate. This consisted of a leather strap, reaching from the side of the delivery bed to the floor, to which he had sewed a saddle stirrup at one end, and the other end he tied to the handle of his forceps. His foot in the stirrup and the heel on the floor, the weight on the handles was directed by the ball of the foot, which furnished the *vis a fronte*, and thus saved his back. Turning to the illustrious Joseph Price, one of our founders, Dr. Goodell remarked, "You may have seen the apparatus hanging on the gas fixture, at Preston Retreat, Dr. Price." Price, in his laconic

fashion, replied, "Yes, I have seen it." Dr. Parvin made no comment on the labor-saving device of his distinguished fellow professor.

Three of the philosophic essays, which Parvin presented a third of a century ago, analyzing many current problems, are a most interesting study. Some of his conclusions are now anachronistic; in others he was, in his vision, far ahead of his generation. These three were his addresses entitled, "The Genius of Medicine," "The Woman and Her Physician," and "The Casuistry of Medicine."

"The Genius of Medicine" was made the topic of an elaborate address by Parvin at Louisville in 1883. He took as his theme Conte's definition of a science, as "Knowledge which enables us to see and to foretell results." Parvin said in substance, "Let any case of common disease be examined by half a dozen educated physicians; there would be in almost every instance an exact agreement as to the nature of the malady, its progress and the means advisable to eliminate it, or to shorten its course. The natural history of disease is so well known that the physician can, in the majority of cases, foresee and foretell it."

"It is not essential to science that it be at any given time complete or free from error. It is called science in reference to the aim and method of the intellectual process of which it is the result, not in reference to its own absolute correctness and completeness.

"The certainties in diagnosis and prognosis of disease in recent years add to the just claim of medicine to be considered a science.

"The remarkable fact regarding remedies has always been that the great masters have used but few medicines. Hippocrates set the shining example. Syndenham said, half in jest, that he could carry all the drugs that he needed in the head of his cane. Booerhave in his day said that the enlightened physician could practice medicine with opium, cinchona, mercury, salts and water. Hoffman, of the famous anodyne, however, must rejoice had he lived today, and recant his famous declaration of scepticism, 'Fuge medicos et medicamenta, si vis esse salvus.'"

While rejoicing in the important position of medicine, the student must not forget, declares Parvin, that the foundations of our science were laid and the form of the superstructure largely directed by Hippocrates, the noble Greek who stands among physicians as Alexander among warriors, Homer among the poets and Plato among the philosophers.

Greek medicine, however, Duremberg asserts, which was the origin of the medicine of today, came not from the temple nor from the gymnasium, but from the laboratory of the physician. Parvin asserts that the medicine of Homer is very human in that he observes that, between the medicine of the gods and of Hippocrates, true medicine lived without eclipse, just as it existed in his own day with mesmerism

and spiritualism, and we may add in our present day with Christian Science, osteopathy, chiropractic and all the other cults.

Aesculapius, who was reputed able to restore men to life, was promptly suppressed by one of the thunderbolts of Jupiter. The moral of which, Parvin points out, is that doctors should let the dead stay dead, influenced as much by the fate of Aesculapius as by the reason which Moliere has put into the mouth of Saganarelle, "The best of the medical profession is that there is the greatest honesty and discretion among the dead, for you never find them complaining of the physician who killed them." Or as a modern Kansas City undertaker advertises in the street cars, "Twenty-seven years of perfect service, without the complaint of a single patron."

Hippocrates did much to emancipate medicine from the superstition and charlatanry of the primitive peoples who preceded him. He taught that pathology was a part of physiology; he urged the importance of careful clinical observation, and Parvin asserts that he separated the true from the false. He set down a narrative of the special cases of his patients, and how they were judged by recovery or death. Parvin claims that Hippocrates diagnosed puerperal septicemia and shows that the man whom Galen termed the greatest of physicians and the first of philosophers, observed facts 300 years B.C. which we are rediscovering today. Parvin characterizes his genius, grave, wise, charitable, careful of the dignity of his art, always avowing his powerlessness, a sagacious observer endowed with exquisite medical sense, judging phenomena in their connection, he ascribed to medicine the form which has triumphed over all the ages. He quotes the words of Chauffard, "Primordial truths are the autonomy of life, the unity of existence, its spontaneity and finality." These principles were the source of Hippocratic medicine.

One of Parvin's best remembered orations is that in which he discusses woman and her physician. Briefly referring to some of the more obvious physical differences between woman and man, Parvin, quoting from Moreau, in his *Natural History of Woman*, says, "These differences, the general delicacy of muscles and the elegance and beauty of form, belong to the essential nature of women. Education and habits of life may increase these characteristics, as Hippocrates was forced to avow. Nevertheless, there remains a radical, innate difference in structure which will be found in all countries, and among all peoples."

Parvin said, "Beauty is one of the most common of woman's physical characteristics. Age, disease, poverty, suffering, ignorance, the play and power of evil passions, wicked habits may mar or destroy the beauty, not in a single individual only, but in those deriving their origin from her. Nevertheless, this gracious gift is the general possession of the sex."

In the twenty-fourth ode of Anacreon, the Greek poet, wherein he speaks of nature having given to all that breathe the air of heaven some boon, wreathed horns to the bull, the hoof of strength to the steed, speed to the timid hare, Parvin found the following apostrophe to woman. This was quoted to Dr. Speidel from memory by Dr. Wm. B. Doherty, of Louisville, now eighty-four years old, and who was in 1870 a friend and contemporary of Parvin, on the faculty of the University of Louisville.

To man she gave in that proud hour
The boon of intellectual power.
Then, what O woman! what for thee
Was left in Nature's treasury?
She gave thee beauty—mightier far
Than all the pomp and power of war.
Nor steel nor fire itself hath power,
Like woman in her conquering hour.
So be but fair, mankind adores thee,
Smile, and a world is weak before thee!

Dr. Parvin's motive in this address was to emphasize the peculiar type of the relation between the sexes, and the delicacy needed to be used in the practice of gynecology and obstetrics as contrasted with the other phases of medicine. He took up the questions of confidence and esteem growing out of this intimate experience, and emphatically expressed his opinion that the great profession as a body is on the highest plane as regards morals.

With one of his apt classical quotations he shows the other side of the picture, the small number of physicians who fail to measure up to this high standard. The eagle which stole the meat from the altar of the gods and flew home to its nest with its prey, carried with it a coal of fire, which soon consumed the nest and the young eaglets.

Parvin says that the physician who enters the home of virtue with any but the purest sentiments will sooner or later perish like the eagle's nest.

The great effort Parvin made in the essay entitled "The Casuistry of Medicine" seems to me to be entitled to more extensive consideration because it is as pertinent in its application today as when written. In this essay Parvin presents the problem that dominates all philosophy, all science and its application to art, not only in the ordinary relations of life but to us, specifically, through the evolution of medicine, from that of Aesculapius and Hippocrates down to our own myriad of specialties—the problem of right or wrong in a debatable decision.

The word casuistry was first applied to the discussions of the theologians, especially the famous order of Jesuits, occupied in solving questions of conscience. The word fell into disrepute because of

certain alleged abuses of this method of reasoning. Casuistry is popularly interpreted as meaning sophistry; that is, subtle and dishonest reasoning. Parvin interpreted it by its original classical meaning, the application of ethical principles to questions of conscience and judgment.

We are reminded that, forty years ago, Dr. Fairchild, president of Oberlin College, was asked by one of his students in his course of lectures in Moral Philosophy, if a lie were ever justifiable. The Professor answered, "No, but let us first define a lie. A lie is an untruth told maliciously and designed to somebody's hurt. An untruth told by a physician to a patient saying he is better, even if a question might exist as to the exact fact, is not a lie, as it is told for the well being, not the injury to the patient."

John Galsworthy, in *Saint's Progress*, discussing the pragmatism of Henry James, makes James justify the assertion of one of his characters, "That what we do is not wrong until it is proved wrong by the result."

Parvin said that Zoroaster gave as one of the best guides in making human conduct correspond to the claims of conscience, this maxim, "In doubt as to whether an action is right or wrong, abstain." Parvin advises that, admirable as is Zoroaster's rule, it may fail of adaptation in many of life's emergencies. Its light may go out and leave us in darkness. Not to resolve may be to resolve. We may be compelled to do one of several things, being unable to fold our arms and reject all because we do not know which is best. This is true in obstetrics as much as in any branch of medicine.

DeQuincy said that the necessity of casuistry can be deduced from the very origin and genesis of the word, casus, a case. It is really the science of cases.

After morality has done its very utmost in clearing up the ground upon which it rests its decisions, after it has multiplied its rules to every possible point of circumstantiality, there will always continue to arise cases without end, in the shifting combination of human action, about which a question will remain if they do, or do not, fall under any of the rules.

The best way of seeing this truth illustrated on a broad scale, the shortest and most decisive, is to point our attention to one striking fact, namely, that all ethics and all law in every civilized land are based on casuistry. Parvin explains that casuistry does not seek the evasion of the law nor compliance with the letter while the spirit is violated.

Science is perpetually propounding questions in casuistry or demanding new answers to old ones. This is true in medicine. In medicine, also, the elements of time and place are often concerned in the responses to casuistic questions. The moral philosophers were con-

tinually presenting problems in casuistry. Parvin says it is certainly discouraging, seeking universal and immutable foundations for morals and therefore immutable and universal laws for the government of human conduct, to find the same questions answered in different manner by different people in different ages.

The elder Cato was asked what he thought of usury. He replied, "What do I think of murder?" But today most enlightened people regard usury as just and right.

Pascal's words, "In the just and the unjust we find hardly anything which does not change character in changing climate," cannot be denied as expressing at least a partial truth. "The degree of elevation of the poles reverses the whole of jurisprudence. A meridian and a few years of possession decide the truth. Fundamental laws change. Right has its epoch; a pleasant justice which a river or a mountain may limit. Truth this side the Pyrenees, error on the other."

Obstetric art offers many illustrations of the points made by the great French philosopher. When gastroelytrotomy was proposed by Gailliard Thomas, Fordyce Barker said publicly if the value of the operation was established it would be necessary to restudy the whole subject of obstetric ethics. Winckel, with the majority of Europeans, said the operation had no future. Porro's operation, which Parvin remarked was originally almost exclusively the technic of Italian gynecologists, is now recognized as a most beneficent measure where it is properly indicated.

A question of casuistry is offered when in the course of a case of pregnancy albuminuric retinitis is discovered by the ophthalmologist. He announces to the obstetrician that the vision and perhaps even the life of the pregnant woman is imperiled by the continuance of her pregnancy. What answer is to be made? What course shall the obstetrician pursue?

Even in Parvin's time the cult of birth control was beginning to grow throughout the world. He says, "Means of preventing conception in married women are known to physicians. Admitting his knowledge of the means of contraception, shall the doctor inform married men and women of the means? The knowledge given in these cases in which it may seem necessary is not kept secret by the immediate recipients, but will be imparted to others who have no just excuse for the avoidance of child bearing. The knowledge will become general, and thus a strong defense to the virtue of woman is taken away and the purity of countless lives and the peace of countless homes is sacrificed to man's selfishness."

Parvin says one has no right to put into the hands of another a loaded pistol, when it is probable he will use it for homicide or sui-

cide. We are morally responsible for imparting knowledge which we know will be used for evil.

The recognition of this law by Galen was commended by the illustrious Sir Thomas Browne, in his *Pseudoxica Epidemica*, "We commend the wisdom and goodness of Galen who would not leave unto the world too subtle a theory of poisons, unarming thereby the malice of venomous spirits, whose ignorance must now be contented with sublimate and arsenic."

Parvin says that laws are frequently so made that much is conceded to human weakness; that the standard of legal enactment is not formed for perfect beings, but brought down to the level of the intellectual and moral development of its subjects. Even Divine law has stooped to the moral imperfection of man, since the Great Teacher asserted to the Jews that the conditions of divorce were lowered by Moses on account of the hardness of their hearts.

Moreover, let it be recognized that frequent childbearing is in some women the cause of rapidly failing health and strength. Children come faster than the means to properly care for them is acquired. Infants are born with feeble organization, or hereditary taint, and as time goes on they may prove defective in mental power or of moral bad character, so that one may be tempted to say better had he never been born, or better dead than living. Nevertheless, all the condescension of law acknowledged and these conditions of fact admitted, and even though we may not believe that the back is always given the strength to bear its burden, or the wind is tempered to the shorn lamb, Parvin argues that the physician takes a great responsibility who endeavors to thwart the law of nature, "Lex, lex, dura sed lex." If there be an instance where the physician should impart such knowledge it should be exceedingly rare, and the nicest casuistry is necessary.

Dr. E. H. Forbes, of the Pennsylvania State College, in an address at the American Institute of Politics, Williamstown, Mass., August, 1926, made a statement that the world's population is increasing more rapidly than the quantitive food supply, and he predicted that the problem of the nutrition of the world must be solved in one of three ways: by starvation, by war, or by the attainment of a level between births and deaths at an equilibrium which will adequately provide for variation in food production.

That there can be any immediate need of the application of the Malthusian law even within several centuries is the conclusion of some of our most distinguished statisticians like Dr. Dublin of the Metropolitan Life Insurance Company, who, in an address at the recent Birth Control Congress, in New York City, argued against the economic necessity of the propaganda as not being for our generation.

The Census Bureau shows that our native stock of New England has an average of far less than the four children to the family, which

it is claimed necessary to conserve our birth rate. Sixty years ago the average family in New England comprised seven children, today there are two children. In other words, birth control as already applied to the United States, forty-five years after Parvin's warning words, is resulting in the gradual extinction of our old New England and Virginia colonial families, while the more precocious Middle Europeans with ten children to the family will in a few generations constitute numerically the first families of the nation. Birth control is a doctrine which applies to the wrong element of the population.

The question of birth control in its effect on the health of women is presented by Dr. G. W. Kosmak in his thoughtful discussion of "Birth Control Propaganda and Its Interest to the Physician." He points out that artificial restriction in the early months of married life may produce serious consequences in the woman's pelvic organs and lead to subsequent sterility, or actually hide the presence of this condition, which might have been relieved had its existence been known. We need birth release, not birth control. It is inexpedient to release for the public information without discriminatory precaution which would, in the end, be most detrimental to the community.

Instead of the founding of birth control clinics, where uncertain and sometimes ridiculous contraceptive propaganda is given out, Dr. Kosmak advises that training in sex education should begin in the schools in a healthy, clean study of the matter as a part of biology. Such advice as need be given by the physician, in presence of definite pathologic indications, should be restricted to individual cases as a medical, not an economic, measure.

Forty years ago one of the foremost questions of casuistry was between the operation of craniotomy and a technic designed to save the unborn child. In Parvin's day Lusk had just performed his first successful cesarean, at Bellevue, and the question of craniotomy on the living child was being bitterly assailed by the conservative obstetrician. The enormous maternal mortality in cesarean previous to that time resulted in indiscriminate resort to craniotomy rather than to attempt to deliver the fetus by abdominal section.

Dr. Parvin quotes from Phillips, a distinguished British obstetrician, who in discussing the question of the danger of pelvic contraction which is met by the indication of premature labor, and that in which abdominal section is indicated by the narrow limits of the conjugate in which he would be confined, places a premium on cesarean by restricting craniotomy to a quarter of an inch. The victory for cesarean is thus absolute and craniotomy on the living child is thus condemned by the limitation.

He says, "The question of two women, each having a pelvic deformity such that they could not be delivered of living children but could be safely delivered by craniotomy, is presented. One is very poor

and could not take suitable care of a child, therefore she does not desire one. The other, in comfortable circumstances, desires to have a living child. The question in casuistry arises, Might the obstetrician be guided in any degree by these maternal desires? The direct answer, says Dr. Phillips, is difficult and would vary in different cases. If they be consistent with the course of procedure of the practitioner, the desires of the patient should not be passed over. One is reminded of the answer of the Delphic oracle, 'If Croesus should make war upon the Persians he will destroy a mighty empire.' Encouraged by this reply, he made war upon the Persians, but it was the empire of Croesus, not that of Cyrus, which was destroyed.'' Parvin concludes that, if consistent with the course of procedure of the practitioner, these desires will not be passed over. But the procedure differs. One operator will perform craniotomy in each case, another will do abdominal section for both patients, while a third may be guided by the maternal desire.

Parvin narrates three cases in which, following craniotomy, the child surviving, after consultation a crotchet was used through the opening of the skull into the medulla. This he admits as one of the most painful, serious and difficult questions in the casuistry of obstetrics.

Another type of casuistry of the present day is to be mentioned at this point, a type of casuistry founded not upon the results of research, but upon the assertion of a personal viewpoint wholly illogical and empirical, calling to mind Voltaire's famous declaration: ''I give this to you, not because it is the best, but because it is mine.''

We revere Lawson Tait for his invaluable work in gynecology, plowing a furrow in a virgin field fifty years ago. I very well recall personally hearing Mr. Tait in Birmingham in 1890, discussing the question of surgical teaching. He said that if he had a son who desired to become a surgeon he would prefer to apprentice him to a carpenter, to learn to use a saw and chisel, rather than to have him study minute anatomy. And speaking of asepsis, in derision of Lister's carbolic spray, he declared he wished he could find a handful of bacteria and throw them into the first open abdomen he incised. He would have no fear of the consequences. The effect of such a declaration upon a young man just out of college, where asepsis was beginning to be taught, can well be imagined. It could never be forgotten.

Regardless of Mr. Tait's brilliant operative skill and his ability as a speaker, we all know that he lived to recognize the delusion into which his casuistry had led him, and to acknowledge the truth of the germ theory. This remark of Mr. Tait is characteristic of a great class of men who today dominate the technical demonstration of surgery.

In the August, 1926, issue of THE AMERICAN JOURNAL OF OBSTETRICS AND GYNECOLOGY, Dr. William P. Graves says: "Many of the problems of conservation that confront the surgeon are met with in patients who have reached or passed the age of maturity, which, with some wide variations, may be set at twenty-two years.

"For the solution of these problems one must adopt a real valuation of the genital organs of the woman. No one will deny that the genital system of the woman was designed by nature ultimately for reproduction. It must be granted, therefore, that it is the duty of the surgeon to follow nature's purpose and, in every way consistent with the patient's health and life, to endeavor to conserve or to restore her reproductive power."

To this obviously righteous doctrine, members of the profession do not react uniformly on account of a difference of opinion as to what constitutes the welfare of the patient. Thus, during an operation a conscientious operator may adopt contraceptive measures which, to another equally discriminating and conscientious surgeon, would be inexcusable. Therein lies the casuistry, the answer to the question of conscientious judgment.

It will be seen by the wide discrepancy shown regarding so many obstetric methods that today we have not yet solved all the problems of casuistry. The individual preference still prevails in so many cases.

Dr. Asa B. Davis is enthusiastic over the Gwathmey synergistic method of anesthesia, and considers it ideal; another obstetrician will use chloroform in labor, another depends on ether, a third on gas oxygen; a fourth selects his cases according to conditions, or starts with scopolamine-pantopon and then resorts to inhalation. This is pure casuistry.

Dr. Bill prefers the Scanzoni rotation for a posterior head; Dr. Potter does his version; a third man relies on the Kielland forceps.

One specialist says, "Once a cesarean, always a cesarean"; another essays to discriminate his cases by a test of labor.

Dr. Polak gives us a vivid picture of his differential method of treatment of cases of ectopic gestation; one technic for the tragic, another for the nontragic; another operator believes in waiting in all cases, while a third will make an emergency of every one.

Whitridge Williams and Eardley Holland depend on the Vorhees' bag in placenta previa; another man will rupture the membranes and attempt accouchement forcé; a third resorts to immediate hysterotomy.

Ross McPherson, with the method of Stroganoff, shows remarkable results of low mortality in eclampsia; Tweedy and the Dublin school are equally insistent on the statistics developed by the use of the elimination technic.

Dr. Titus and his associates demonstrate that glucose and insulin

in vomiting of pregnancy and other types of toxemia give results superior to the methods heretofore recommended; another group makes equally strong claims for magnesium sulphate.

All these varying methods of technic are matters of conscience and judgment, dependent upon individual skill in their use, and the ethics which determines them is pure casuistry, just as real in its application today as were the teachings of Hippocrates and of Galen, or those of Oliver Wendell Holmes and Theophilus Parvin in the time in which they lived.

All of which goes to show that medicine, while it is a science, can never be considered an exact science.

The casuistry of Parvin applies to the reasoning, the judgment and the philosophy of obstetrics and gynecologic surgery today in its every phase just as it has done from the beginning of civilization.

1100 Grand Avenue.

THE DETAILS OF POSTPARTUM CARE*

By John Osborn Polak, M.Sc., M.D., F.A.C.S., Brooklyn, N. Y.

OVER 60 per cent of the lesions which make up the diseases peculiar to women are the direct results of poor midwifery, the incidence of trauma, infection, and a lack of appreciation of the physiologic and biochemical processes which take place in involution,—yet little or nothing has been collectively written regarding their prevention by better intrapartum and postpartum care. The functions of the obstetrician are:

1. To deliver the woman of a living child with minimum injury to her general system and to her local soft parts.

2. To leave her in such physical condition that she may be an economic asset to her family and to the community, namely, assume charge of her child, nurse it, and attend to her household and social duties. To obtain such a result, presupposes careful antepartum observation, a labor that is properly managed, hemorrhage controlled, injuries repaired, involution completed (which is favored by breast feeding) and, before she is discharged, the correction of uterine displacements. In this short contribution, I shall describe some of the practices employed in our postpartum and follow-up clinic at the Long Island College Hospital; briefly reviewing the physiology of involution, in order that we may lay emphasis upon the effect of subinvolution and the correction and retention of acquired retrodeviations. In support of my contentions I shall give a few figures from the clinic and from my pri-

*Read at the Thirty-ninth Annual Meeting of the American Association of Obstetricians, Gynecologists, and Abdominal Surgeons, held in Chicago, Ill., September 20-22, 1926.

vate practice, which may perhaps convince some of our unbelievers that in adopting a course of rational routine, detailed though it may seem, more ideal results may be obtained.

While the portion of this symposium assigned to me properly deals with postpartum management and the results, certain obstetric axioms will bear repetition on the basis of cause and effect.

It is a well-known fact too often forgotten that the first stage of labor takes time and pain to secure dilatation of the cervix, and that it is accomplished by a series of physiologic acts so perfectly executed that man cannot improve upon them. These, however, may be favored by the judicious use of anodynes, such as morphine and scopolamine or heroin or, when the head enters the pelvis, by the employment of oil-ether and magnesium sulphate.

Relief of pain, time, sufficient rest, food, and plenty of fluids are the basic principles in the conduct of the first stage. When the presenting part has passed through the cervix into the vagina and internal rotation occurs, too much delay on the distending pelvic floor produces fascial stretching with subsequent relaxation of the anterior and posterior vaginal walls, *even when there is no apparent laceration.* It is only after the head has passed into the vagina, having escaped from the cervix, that the fetus is in danger from interference with the uteroplacental circulation; hence it is at this time that *watching the effect of uterine contraction on the fetal heart is imperative.* The expulsive stage may be shortened by "forceps control," and by the timely use of median or lateral perineotomy *which relieves the pressure on the anterior fascial plates* and thus prevents the occurrence of cystocele and irregular pelvic floor lacerations.

It has been our practice to apply a pair of Hale forceps to the sides of the head as soon as the sagittal suture has rotated into the anterior posterior diameter and the head begins to "crown," these are not used for traction but for control. Then as "crowning" takes place with the pelvic floor on the stretch, a pair of straight Mayo scissors is passed in the median line, between the head and the vaginal mucosa, and the soft parts are divided. *The median incision should be used when the outlet diameters are normal, while an oblique lateral incision is made if the bisischial is below 8 cm.* The extent of the incision is entirely governed by the degree of soft part obstruction which is offered,—it usually extends down to the anal sphincter, or in funnel pelves around to the side of it. This allows easy delivery of the head through an incised wound of the introitus, instead of producing a lacerated bisulcal tear. Experience alone can teach one when and how far to incise, but year after year the logic of this procedure is driven home by the results we obtain in primiparous labors. *Postpartum care begins immediately upon the delivery of the child.* The anesthetic is withdrawn; the perineotomy wound is plugged with a

large pad of sterile gauze to control oozing until the placenta is delivered; the cord is pulled down and clamped close to the vulva, and half an ampoule of pituitary extract is given hypodermically. There is absolutely no manipulation of the uterine fundus, which may be found just to the right and above the umbilicus; and unless uterine expression has been attempted, the placenta will remain attached to

Fig. 1.—Compression of the lower uterine segment against the promontory, shutting off the uterine circulation, while the other hand rubs the fundus into contraction. (Postpartum Hemorrhage from Atony.)

the placental site, and no bleeding can occur until the placenta is separated by the formation of a retroplacental blood clot. When this occurs the classical signs of separation are apparent and not until then is any attempt made at expression, hence, when the fundus rises, the cord descends and blood appears at the vulva, the fundus is grasped with the left hand, the fingers of which are placed behind and the thumb in front, and the uterus which has been acutely anteflexed

to bring it within the grasp of the hand, is laid down in the abdomen to obliterate the uterovaginal angle and at the acme of the contraction the placenta is expressed by Credè. As the placenta escapes from the vulva the right hand is placed just above the pubis, the lower segment is grasped between the thumb and fingers, and the uterine body is raised out of the pelvis while the lower segment is compressed against the sacral promontory. As the uterus is raised out of the pelvis the inverted membranes are detached by the traction made upon them by the weight of the placenta. Cutting off the uterine blood supply by compression of the lower segment against the promontory favors contraction and retraction of the fundus. By following this technic in detail our average blood loss in the past two years has been less than 200 c.c. which figure includes two postpartum hemorrhages of 1600

Fig. 2.—Sagittal section showing compression of the lower uterine segment against the promontory and the iliac vessels.

c.c. each. This maneuver was first suggested by R. L. Dickinson in 1908.

Bleeding of any considerable amount occurring immediately after the delivery of the child, with the fundus firm, indicates cervical injury and should demand inspection of the cervix after the placenta has been expelled.

Primary suture of the torn cervix with proper technic is relatively easy and these immediate repairs heal with great nicety and obviate later trouble. Routine cervical suture, however, cannot be generally indorsed for it is distinctly a hospital procedure and requires surgical training *and a perfect aseptic technic.*

When the uterus is firmly contracted and all uterine bleeding has ceased a sterile vaginal tampon is placed against the cervix and the

pelvic floor injury is exposed by lateral traction with a Gelpi or Friedlaender retractor and an anterior trowel so as to illuminate the limits of the tear. A traction suture is then placed parallel to the long axis of the vagina, entering at the lateral limit of the tear, passing deeply under the vaginal mucosa so as to include the levators of one side to the apex of the wound and down through similar tissues on the opposite side emerging at a corresponding point to the point of entrance. Traction on this suture brings the levators forward and

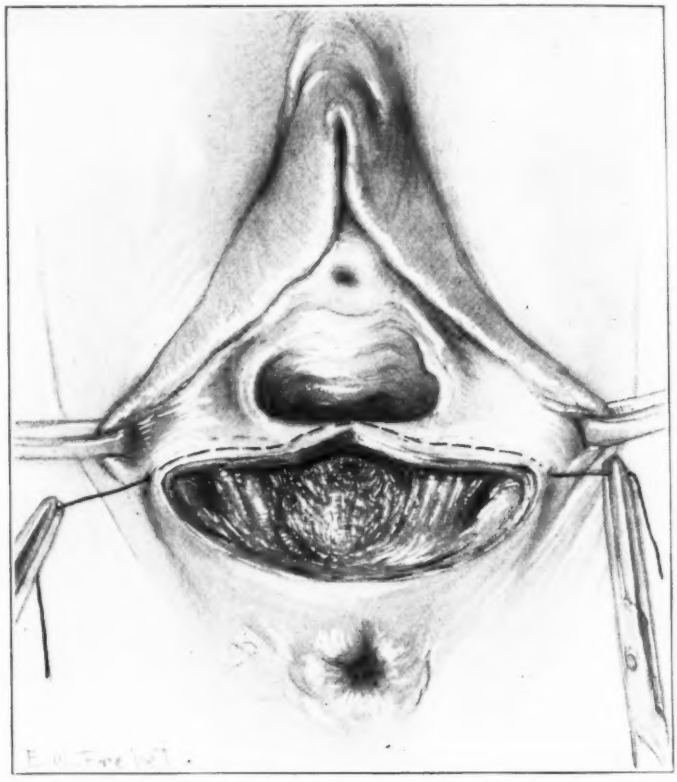


Fig. 3.—Preliminary traction suture passed behind the levators and above the apex of the perineotomy wound—traction on the ends brings all of the tissues forward and facilitates suturing.

makes repair of the uppermost angle easy; for the uniting sutures can then be passed from above downward bringing like tissues together, fascia to fascia, muscle to muscle, and mucosa to mucosa. This repair may be done with interrupted sutures of iodized gut (which we use) or with a buried continuous suture. There is some advantage in having the traction suture of silkworm-gut, for, when tied, it acts as a splint. *No pads are used for we believe that the wound is sealed in a few hours and that pads are likely to carry rather than prevent infection.*

When all bleeding has ceased, before leaving the woman, it is our practice to grasp the fundus and expel the first clot, for the second clot will be smaller and retraction better. At this time ergot or some of its derivatives is given. After the patient has been returned to bed a course of ergot is given in half-dram doses, every three hours during the first day,—this is supplemented by placing *an ice bag on the abdomen over the fundus*, which further stimulates the uterus to contract and retract. Immediately after the woman reacts from her anesthetic the head of the bed is elevated some eighteen inches and she is placed in the Fowler position; the bed remains elevated for the first forty-eight hours unless a severe blood loss has been sustained. Postural drainage and a well retracted uterus offer the greatest barrier to infection, for with the sinuses sealed with firm thrombi, migration of the vaginal flora is but a harmless excursion. Involution is the physiologic process by which the hypertrophied structures taking part in the development, growth, and nutrition of the ovum return to their normal size, tone, and function. The term involution should not be applied alone to the uterus for it includes all of the tissues of the pelvic soft parts; it is, however, with the uterus that practically all of the studies relative to involution have been made. It takes from ten to twelve weeks to complete this process and any interference with the normal changes leaves a permanent pathology which arrests the perfection of the physiologic process.

The uterus as a whole at the close of labor is said to weigh from 800 to 1000 grams; it measures from 15 to 20 cm. in length, and from 11 to 12 cm. in breadth at the level of the fallopian tubes. The wall of the upper uterine segment is from 3 to 4 cm. in thickness while the sound measurement of the uterine cavity is from 14 to 16 cm. When one compares these figures with his impression of the normal uterus on bimanual examination or the sound measurements of the nulliparous organ with a cavity depth of only 6 to 7 cm. he must begin to appreciate the necessary physiologic changes which take place in the course of involution to accomplish this great reduction in size, especially when the uterus has reached the stage of hyperinvolution.

During pregnancy the muscle cells are greatly hypertrophied being 10 or 12 times the normal length and 3 or 4 times their normal breadth. It is therefore apparent that after labor we have an enormous amount of tissue which must disappear, as evidenced by the fact that in the first two weeks the uterus loses something over a pound in weight. This takes place as the result, (1) of increased oxidation, and (2) continued contraction and retraction producing a relative anemia of the organ, for, as the uterus contracts and retracts, shutting off its blood supply, the muscle fibers undergo a rapid fatty degeneration while the fibrous tissues degenerate through hyaline changes and are partially absorbed.

The large cells degenerate only to a certain point, and atrophy usually ceases as soon as the cells reach their original size.

The primary changes, however, will be seen to be in the blood vessels for, according to Goodall, the uterus renews all of its arteries after each pregnancy. The old vessels become more tortuous, many may become obliterated by thrombi, while others have thrombi formed within them, thereby diminishing their lumen, and their coats undergo hyaline changes. This sudden reduction of the blood supply causes the muscle fibers to undergo fatty changes which allow of more or less absorption. The cervix undergoes involution in a manner similar to that of the body so that the whole organ is diminished in size but retains a more or less normal relation of muscle and elastic tissue, except in the later years of sexual life and under the influence of disease when highly specialized tissues have a tendency to be replaced by less specialized tissues, namely, muscle by elastic tissue,—which explains the fibrous uterus found at the menopause and in the multipara. The mucosa also participates in these changes; the inner layer which is in contact with the decidua is thrown off by a process of starvation necrosis, while the basal decidua, which contains the glandular structures, regenerates a new mucosa from epithelial islands; the placental site is the last to receive its protective coating of epithelium. The ovaries also diminish in size, the corpus luteum cyst of the pregnancy usually makes one adnexum larger and more palpable than the other. Similar changes to those in the vessels of the uterus take place in the walls of the vessels about the atrophic corpus luteum. The ligaments and parametrial tissues likewise gradually regain their tone and also the adjacent bladder and rectum.

Having briefly called attention to the changes which normally take place when there is complete involution of the pelvic structures, it will not be amiss to mention that infection, lacerations, with resulting relaxation of the pelvic tissues, which permit any considerable descent of the uterus, retrodisplacement, visceroptosis or full rectum all disturb the circulatory equilibrium within the pelvis and allow passive congestion to occur. These lesions retard the physiologic processes and leave a permanent pathology which is recognizable years later and produce a symptom complex known as the gynecologic triad; i.e., hemorrhage, leucorrhea, and pain. We attempt and in great part succeed in combating the occurrence of these conditions by: (1) the avoidance of infection, (2) by minimizing the trauma of labor, (3) by limiting the blood loss, (4) by the immediate repair of birth injuries, (5) by maintaining retraction and contraction of the uterus by encouraging breast feeding and thus favoring the physiologic acts included in involution, (6) by favoring uterine and vaginal drainage by the employment of posture, (7) by reestablishing the intraabdominal pressure and the muscular tone of the abdominal wall by having the woman practice

suitable active exercises, (8) by intermittently emptying the venous pelvic engorgement by having the patient assume the knee-chest position several times a day, (9) by recognizing and treating the coexisting erosions of the cervical mucosa at a time when extension of the infection may be prevented, (10) by the correction of all malpositions and displacements of the uterus with the associated engorgement of the pampiniform plexus by posture, manipulation, and the retention of the reposited uterus with a properly fitted pessary, and (11) in checking up on these conditions by periodic postpartal examinations until the involution is complete and the anatomic relations perfect.

It is needless for me to call attention to the means of minimizing the trauma of labor, except to restate the principle that the cervix must be fully dilated by the physiologic processes; i.e., labor pains and the hydrostatic action of the bag of waters; and the head must have passed through the cervix or the cervix be so dilatable that the head can pass through it before artificial aid by forceps or version can be considered. Furthermore, we believe that the employment of a properly timed perineotomy in selected cases will preserve the fascial and muscle structures better than the older methods of time, stretching and laceration. Likewise blood loss must be controlled in the third stage of labor, for the anemic woman has less individual resistance to infection and toxemia and in recuperation than the robust normal individual. The anemic woman stands surgery and anesthesia badly, hence in case of excessive blood loss, it is well to allow the woman to react from her shock and have the volume of blood increased by transfusion or infusion before any surgery is undertaken. When injuries do occur immediate surgical repair (patient's condition permitting) should be the rule; this means muscular and fascial reconstruction not mucous membrane and skin suture. At the Long Island College Hospital we make of this repair a surgical procedure, often postponing the operation until the next morning if the labor has been tedious, operative with long anesthesia, and much blood loss.

Contraction and retraction of the uterus must be maintained by ergot and the fundal ice bag in order that thrombi may organize within the vessels. It is the retraction that controls bleeding while the contraction favors uterine drainage. By placing the patient in the Fowler position and encouraging her to turn upon her abdomen three or four times in twenty-four hours the vagina is kept free of lochia, the downward drainage prevents the multiplication and upward migration of the bacteria of the vaginal flora. By lying on the abdomen the woman empties the vagina of all retained discharge and hence the cervix no longer rests in a pool of bacteria.

During pregnancy the enlarging uterus gradually distends the abdomen and separates the recti muscles. When at the close of labor the uterus is suddenly emptied of its contents the intraabdominal pressure is lowered and the intestines and bladder lose their muscular tone and are therefore subject to distension. It was formerly the practice to control this distension by employing a tight abdominal binder, under the false impression that this artificial support would

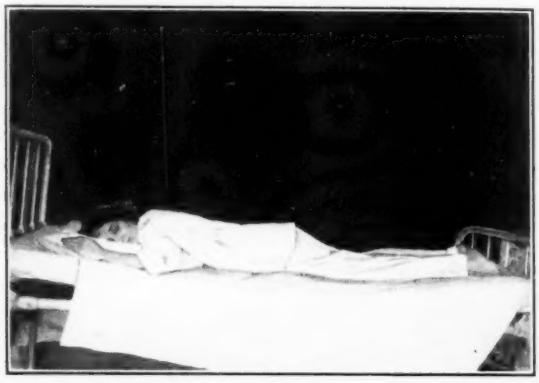


Fig. 4.—Postural drainage. Patient on her abdomen in the Fowler position.

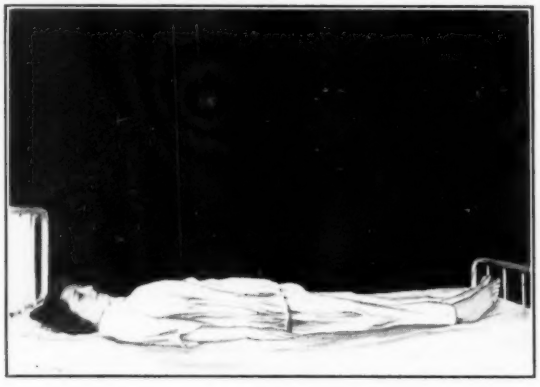


Fig. 5.—Breathing exercise.*

remedy the muscular weakness. We now know that the muscular tone of the abdominal muscles may be restored by suitable active exercises which the woman can do several times a day while lying in bed, and so replace the muscular support that nature intended the abdomen to have. These exercises may be begun after the first forty-eight hours of the puerperium.

When we consider the immense increase in the pelvic circulation necessary for the development of pregnancy, we can readily appreciate

*Figs. 5 to 13 show exercises used during the first ten days of the puerperal period in the maternity service, Long Island College Hospital.

Fig. 6.—First exercise used for improving tone of the abdominal muscles.

Fig. 7.—By elevating the diaphragm the abdominal content is raised and circulation improved.

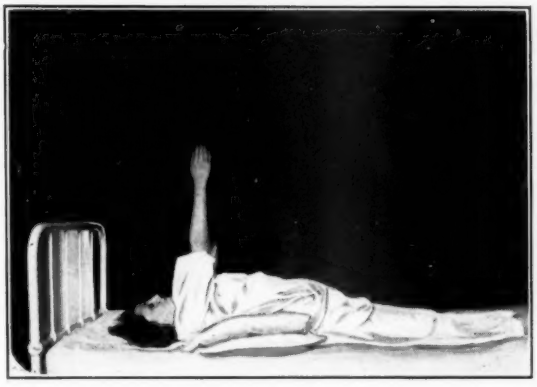


Fig. 8.—Deep breathing exercises.

that the sudden emptying of the uterus with its firm retraction, compression, and vessel torsion will so engorge the pelvic veins that edema and tissue swelling must take place, unless the engorged veins are emptied by gravity as when the knee-chest position is assumed for ten minutes three or four times a day. This position serves the double purpose of emptying the engorged veins and massaging the pelvic ligaments and may be begun as soon as the lochia alba appear. With

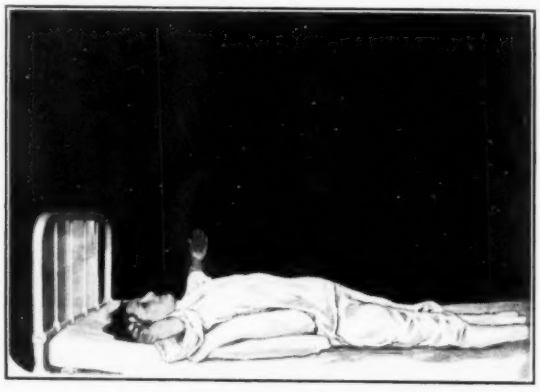


Fig. 9.—Deep breathing exercises.

Fig. 10.—Leg exercises for developing the abdominal muscles.

lochia rubra we cannot be sure that the sinuses are completely closed, hence there is possible danger of embolus or of an extending thrombosis by too early muscular activity. Not infrequently the use of the knee-chest position will start up a red lochia; this is an index that retraction is retarded and that exercises should be discontinued until the bloody discharge ceases. Just about this time; i.e., the fourth or fifth day, when all fragments of placental tissue have been separated and expelled, the mammary secretion begins and may become excessive, with marked breast engorgement and physical discom-

Fig. 11.—Leg exercises—developing the tone of the abdominal muscles.

Fig. 12.—Abducting the thighs to tone up the thigh muscles.

Fig. 13.—Knee-chest position favors emptying the pelvic veins and massages the ligaments.

fort. A single dose of ¼ grain of morphine with breast support will usually control the excess secretion and give comfort; however, if the breasts are large, hard, painful, and pendulous with indurated areas in the outer lower segments, strapping with zinc oxide plaster strips, so placed that they both support and compress the gland, will give almost instant relief, for when properly applied the flow of milk from the nipples is immediately established without trauma to the lactiferous tubules. Mammary strapping, also, has a valuable place in controlling incipient breast infection; as for example, a puerpera of about the eighth or tenth day who has suffered from fissured nipples, has been using a shield, and has had the usual palliative treatment, is suddenly seized with a chilliness, a rise in temperature, localized pain, and an area of induration in the breast. Under such conditions it is our custom to discontinue breast feeding and give ¼ grain of morphine to control the milk secretion, to quiet the pain, and to promote the well-being of the woman. The breast is then snugly

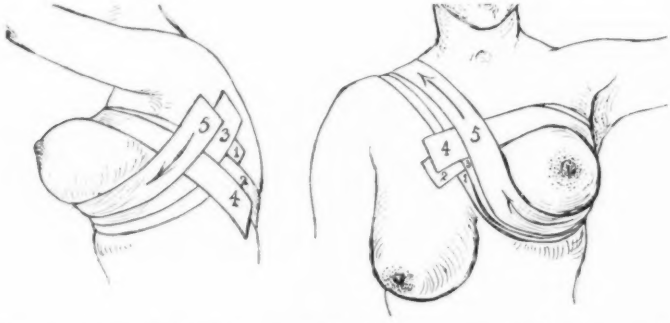


Fig. 14.—Breast strapping for the control of engorgement and as a prophylactic in incipient infection.

strapped in such a way as to produce peripheral circulatory compression as well as to give breast support; in many cases the pain and induration subside and abscess formation is averted.

The cervix after labor is always the seat of a granular endocervicitis, which produces an irritating discharge and is liable to become a mixed infection from the upward spread of the vaginal flora. The application of the electric cautery knife by crucial incision or circular searing to this everted erosion speedily cures the discharge and causes an inversion of the cervical mucosa.

For a number of years it has been our custom to make the final examination of each patient about two days prior to her discharge from the hospital, usually on the fifteenth or eighteenth day of the puerperium. At this time the uterus is commonly found to be well involuted, anteflexed or anteverted, and slightly lower in the pelvis than normal; the vaginal mucous membranes are turgid and the parametria are tender. The patient is then directed to take a "postpartum pill" three times

a day, keep her bowels regular with water, fruit, cereals, and mineral oil, avoid overdistension of the bladder, support the breasts with a well-fitting brassiere, and to wash the nipples before and after nursing with a boroglyceride solution. She is then taught the "monkey trot" and the "mule kick" and is instructed to do these exercises for five or six minutes night and morning. These exercises empty the pelvic veins, massage the ligaments, and help to maintain the uterus in an anterior position.

As a result of the foregoing plan of puerperal care over 90 per cent of our women were discharged from the hospital with the uterus in normal position, but when these same patients returned to the clinic for their follow-up examination three to six weeks later, 38 per cent had the uterus retroverted or retroposited. About eight years ago we started the practice of teaching the "monkey trot" and the "mule kick" to our

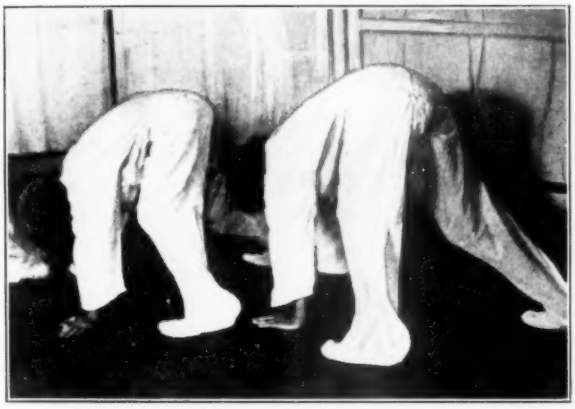


Fig. 15.—The monkey trot.

postpartum clinic and private patients, instructing them to employ these exercises night and morning during the time between their examinations. The adoption of this plan was rewarded by an incidence of only 3 per cent of retroversion, and of these, 2 per cent could be manually reposited and retained by a pessary.

Uterine bleeding after the patients were discharged from the hospital was another annoying symptom which was almost always found to be coincident with subinvolution or displacement; ergot and exercises controlled it when due to subinvolution, while the pessary cured the hemorrhage due to retrodisplacement.

In this day of surgery the pessary is a much neglected aid, yet I feel sure that the large majority of acquired retroversions, provided the patient has intact structures, if treated before they become flexions, can be relieved and many times permanently cured with the pessary.

In closing, permit me to say that too much stress cannot be laid upon the importance of follow-up examinations throughout the postpartum

period and of the correction of malpositions before actual pathologic changes have taken place within the uterine walls, parametria, and the adnexal tissues, and furthermore, that the future health of our women depends largely upon the recognition and employment of the advances that have been made in prenatal study, interpartum asepsis, rational midwifery, and upon weeks of intelligent postpartum care. The traditional ten-day period of care after delivery, the curse of the past, is fortunately relegated to history.

20 LIVINGSTON STREET.

THE OBSTETRIC FUTURE OF WOMEN DELIVERED BY THE LOW OR CERVICAL CESAREAN SECTION*

BY LOUIS E. PHANEUF, M.D., F.A.C.S., BOSTON, MASS.

THE first attempt to place the incision in the cervix in performing cesarean section dates back to 1805 and the credit belongs to Osiander of Goettingen. Obstetricians in general were reluctant to adopt the method and the operation has been brought to its present state of perfection largely through the efforts of a limited group of operators. The low cesarean did not find favor in America until comparatively recently. Barton Cooke Hirst of Philadelphia had advocated his transperitoneal operation for neglected cases in 1908, but as late as 1919 he was still advising the classical operation for routine cases. The same year, 1919, DeLee reported forty cases of cervical cesarean at the seventieth annual session of the American Medical Association. So impressed was he with his results, that he felt that this method would, in the course of time, replace the old classic operation. Since the publication of his monograph, papers by Beck, Cornell, DeLee, Hirst and VanDolsen, Hodgkins, Polak, Polak and Beck, Phaneuf and Quigley have appeared in the American literature. These men were well agreed upon the fact that the advantages offered by this newer procedure greatly overbalanced the slightly increased technical difficulties necessary in its performance.

No one who is interested in this subject should fail to read DeLee's illustrated history of the low or cervical cesarean section which appeared in the October, 1925, issue of the AMERICAN JOURNAL OF OBSTETRICS AND GYNECOLOGY.

The claims which have been made for the cervical operation are:

1. The cervix is that part of the uterus which stands infection the best, a fact repeatedly observed in gynecologic practice; the pelvis is also more resistant to infection than the upper abdomen.

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*Read at the Thirty-ninth Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, held in Chicago, Ill., September 20-22, 1926.

2. The wound is placed in the noncontractile part of the uterus and heals undisturbed, therefore lessening the possibility of rupture in subsequent pregnancies and labors.

3. Adhesions are less frequently encountered since the incision in the uterus is completely covered with peritoneum, and if adhesions occur they are so situated in the pelvis that they are less likely to give rise to serious trouble than if they were found in the upper abdominal cavity.

4. A real test of labor may be given with safety, a point greatly emphasized by all who have had experience with this method, the result of this being that a number of parturients who with the absence of this test might have been delivered abdominally, are delivered through the pelvis.

5. Hernia in the abdominal incision is less frequent since it is a known fact that herniae in suprapubic median incisions are less common than in incisions situated in the upper abdomen.

6. The convalescence approaches more nearly that of a pelvic delivery; it certainly is not the ordeal of the old classical operation.

7. The morbidity and mortality are greatly reduced.

8. Lastly, it permits the delivery of a living child through the abdomen when certain conditions exist which would make the classical operation a hazardous procedure to undertake.

While all these deductions were logical the statistics on repeated operations were too few to prove some of the points claimed, especially the better healing of the cervical incision and the decreased frequency of adhesions. Gaifami, in 1923, reported that in his twelve patients that came to a secondary operation no signs of weakening were found in any of the scars. The writer in his last publication on the subject had reported a like result, namely, no weak points in any of the scars of his thirteen patients who had come to a secondary operation. Hamm in discussing Fleurent's paper stated that he had repeated the low cesarean twice without difficulty but he does not mention the condition of the previous scars. Fleurent reported one pelvic delivery in his series of ten cervical sections.

In discussing a report entitled "Les pelvitomies" by Rossier et Le Lorier, given before the fourth congress of the Association of French Speaking Gynecologists and Obstetricians, held in Paris, October, 1925, Haugh of Copenhagen, who favors the low cesarean rather than pelviotomy, reported two cases of low cervical cesarean section where he was unable to find the previous cervical scar at the secondary operation. He further stated that he saw a similar case in the clinic of Van Rooy at Amsterdam where it was impossible to demonstrate the first scar.

Wetterwald states that 45 per cent of 100 women became pregnant after a low cervical cesarean section. In thirteen cases the operation was repeated; the old scar in the cervix was almost invisible. In forty deliveries, childbirth occurred by the natural route. There was rupture of the scar in one of a total of forty-five women. In 62 per cent of the cases delivery was spontaneous, while spontaneous de-

livery after symphyseotomy has been recorded in about 59 per cent, and after pubiotomy, in 22.7 per cent. After high cesarean section, rupture in successive pelvic deliveries occurred in 25 per cent; after cervical section, in 3 per cent. Low cesarean section is also recommended for placenta previa; ten deliveries occurred by the vagina in eight women that had been previously treated in this way. The literature records ten ruptures in the cicatrix in 3,600 cesarean sections by this technic (0.28 per cent).

My series of cervical cesarean sections consists of 206 operations, 150 by the Sellheim method and 56 by the Veit-Fromme-Hirst. Most of these were published in detail in previous articles and it is with the repeated operations only that I wish to deal in this paper.

In order to understand what conditions may be found at a subsequent operation it is necessary to understand the technic of the various cervical operations.

There are three methods of approaching the cervix in performing cesarean section:

1. *The Modified Sellheim Method.*—This in common use is based on the fourth operation of Sellheim which was modified in small details by Franz, Opitz, Kroenig, Polak, Beck, DeLee and myself. This is the procedure referred to as laparotrachelotomy by DeLee. My personal series includes 150 operations of this type.

This is an intraperitoneal, retrovesical operation, performed through a median, suprapubic longitudinal incision. After opening the abdominal cavity the uterovesical plica is incised transversely; the bladder is separated from the cervix as in doing a hysterectomy; a longitudinal cervical incision is made within the denuded space; the fetus, placenta and membranes are extracted; the cervical incision is closed, and the bladder peritoneum is sutured to the uterus in such a way that the cervical incision is completely covered. The only line of suture thus exposed to the peritoneal cavity is that of a continuous suture of fine catgut which attaches the bladder peritoneum to the uterus and sinks under the bladder as this organ fills. Opitz, Beck and DeLee have modified this operation by raising an upper as well as a lower flap of peritoneum. In their closure they suture the upper peritoneal flap to the lower segment by interrupted sutures thus covering the upper part of the cervical incision, and complete the operation by suturing the lower flap by a continuous suture, in such a way that it overlaps the upper flap. Their claim for this procedure is that it offers more definite protection to the peritoneal cavity should infection occur in the uterus. I close by uniting the peritoneal flaps with a fine continuous catgut suture and do not in any way anchor them to the uterus. My experience has been that this procedure makes the bladder separation at a subsequent section less difficult than if the peritoneum is firmly attached to the uterus.

2. *The Method of Veit-Fromme-Hirst.*—The author has delivered 56 women by this method which was referred to as the transperitoneal operation, and was advised by Veit and Fromme of Halle in 1908. The same year Hirst of Philadelphia independently worked out a similar operation. This is performed through a longitudinal pelvic incision; the vesicouterine peritoneum is incised longitudinally, the bladder is separated from the cervix and two lateral flaps of visceral peritoneum are dissected. These are united to the parietal peritoneum thus creating a so-called extraperitoneal space, through which a longitudinal cervical incision is made and delivery effected. The peritoneal flaps are at first united by carefully applied interrupted catgut su-

tures. Sutures are used instead of clamps as, in my experience, they are less likely to tear the peritoneum and after the closure of the cervical incision they are further approximated by a continuous catgut suture. The peritoneal edges are firmly united in the course of a few hours and thus the cervical incision is entirely extraperitoneal during the convalescence. This method also protects the abdominal cavity from the spill during delivery.

3. *The Method of Latzko, which represents the type of the true extraperitoneal operation.*—Through a median longitudinal pelvic incision the unopened peritoneal sac is lifted off the anterior portion of the inlet, the bladder, and the lower uterine segment. The cervix is thus cleared, a longitudinal incision is made and delivery is accomplished.

I performed my first low cervical operation in December, 1919, and since then have entirely substituted it for the classical operation in my service.

The modified intraperitoneal, retrovesical, Sellheim operation is employed as routine in clean cases, while the Veit-Fromme-Hirst transperitoneal method is resorted to in the presumably infected ones, that is, in these women who have had long labors, ruptured membranes and vaginal examinations, but who are still in fairly good physical condition and have no fever.

Since in the series of cases to be reported the two forms of cervical sections employed were the modified Sellheim and the Veit-Fromme-Hirst, the secondary or repeated operations followed either one of these methods.

Under ideal conditions following the Sellheim procedure, no trace of a previous cesarean section should be found upon opening the abdomen at a subsequent pregnancy. Following the Veit-Fromme-Hirst transperitoneal operation one finds a band of peritoneum, varying in width, extending from the parietal peritoneum to the lower uterine segment. This band is easily resected from the abdominal wall and a Sellheim section can always be performed. The woman who has had a previous Veit-Fromme-Hirst operation is advised to report for delivery before labor sets in so that she is not exposed to the conditions which made that method of delivery necessary with her first labor, and the extra protection offered by this procedure is not essential at her subsequent delivery. In the series of repeated operations reported, therefore, all the cervical sections were of the Sellheim type.

ANALYSIS OF CASES OF REPEATED CERVICAL CESAREAN SECTION

There were 71 cervical operations performed on 30 gravidae; of these 41 were repeated sections in the lower uterine segment. Three women had four, five women had three and twenty-two women had two operations. In the original 30 first operations 14 were done according

to the Veit-Fromme-Hirst method and 16 according to the Sellheim technic. There were no incisional herniae in any of these cases; the abdominal scar of the previous operation was resected at each subsequent delivery. All of the repeated operations were of the Sellheim type except one.

Upon opening the abdomen after the fourteen Veit-Fromme-Hirst operations a peritoneal band varying in width from the size of a string to about two inches, and extending from the cervix to the

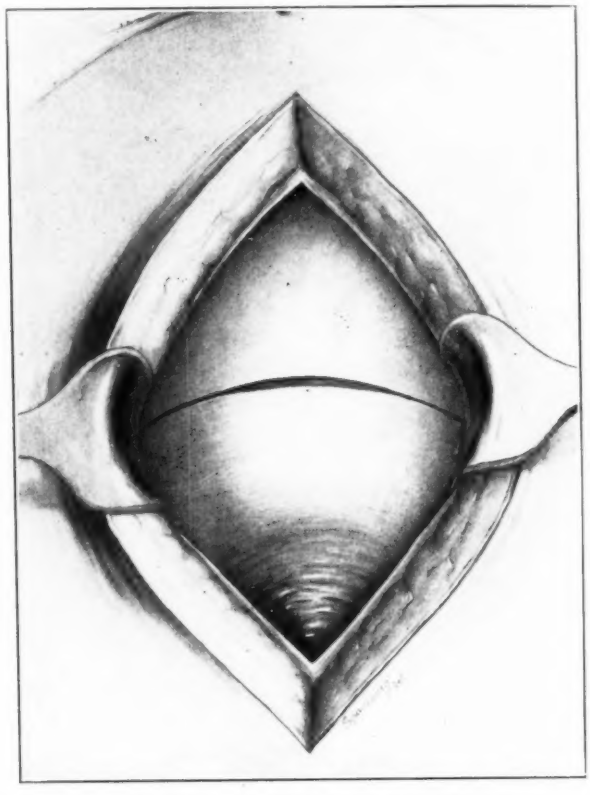

Fig. 1.—Low or cervical cesarean section. Median suprasymphyseal incision exposing the lower uterine segment. The visceral peritoneum is incised transversely where it is loosely attached slightly above the bladder reflection.

abdominal wall was found. This band was resected from the parietal peritoneum before separating the bladder in doing the repeated operation. In the twenty-seven repeated Sellheim sections pelvic adhesions were encountered in seven cases. Four women had one thin band of peritoneal adhesions, one had two narrow bands, and another three fine bands. All these led from the cervix to the anterior abdominal wall. One patient at the third operation showed omental adhesions to the parietal peritoneum. In the twenty other repeated

sections, some of which were fourth operations, the pelvis was absolutely free of adhesions. No difficulty was encountered in separating the bladder a second, third or fourth time. In two women who had had a previous Veit-Fromme-Hirst operation, and in another who had had three previous Sellheim operations, a very small opening was made in the bladder while making the abdominal incision. This was repaired with fine catgut and gave no further trouble.

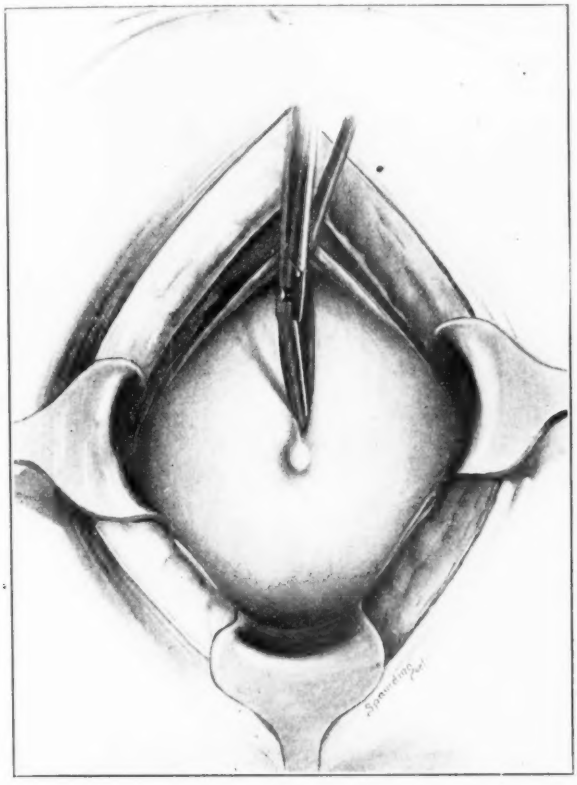

Fig. 2.—Low or cervical cesarean section. A lower flap of peritoneum is separated with the bladder which is held under the symphysis by a retractor. An upper flap of peritoneum is raised and is held by Allis forceps. The lower segment is incised with bandage scissors to protect the child's head.

The most impressive point in this study was that in these forty-one repeated low cesarean sections, upon the separation of the bladder, the lower segment was found to be smooth, there were no depressions and the previous scars, as such, could not be identified. This observation has been confirmed by Gaifami, Haugh, Van Rooy and Wetterwald. In view of these findings, in spite of the fact that the series is small, it seems logical to accept the statement that a cervical scar is a safe one. I have never failed to find the scar of a previous classic operation which came under my observation.

One case deserves special mention. On December 8, 1920, this young woman had a Veit-Fromme-Hirst cesarean section for eclampsia. She had had a number of antepartum and thirty-six postpartum convulsions. She had also been examined vaginally by the attending physicians before operation. She made a satisfactory recovery. On November 8, 1922, she had a low cervical cesarean section, the usual band of adhesions extending from the cervix to the anterior abdominal

Fig. 3.—Low or cervical cesarean section. With the index finger in the child's mouth, the face is turned to the incision. The left hand is introduced under the vertex and pressure is made on the fundus, the head is thus easily delivered. Forceps are practically never used.

wall was resected; the previous cervical scar could not be identified. On March 20, 1924, she had another low cervical section. At this time there were no pelvic adhesions and the two previous scars in the lower segment were not seen. On August 4, 1926, she had her fourth hysterotomy. As the abdominal scar was resected it was found that the lower segment was firmly adherent to the abdominal wall so that the uterine incision was made without in any way entering the peritoneal cavity. Her last convalescence was ideal.

In this series of 71 hysterotomies one woman died at her third operation. She had valvular heart disease and had been kept in bed, part of the time in a hospital, for the large part of her pregnancy. I saw her the day before delivery and she was operated upon April 17, 1926. The day after operation her temperature was normal and her pulse was 100. There were no signs of infection and she died on April 21, 1926, as a result of her cardiac condition. All the gravidae who had repeated cervical sections had very satisfactory recoveries

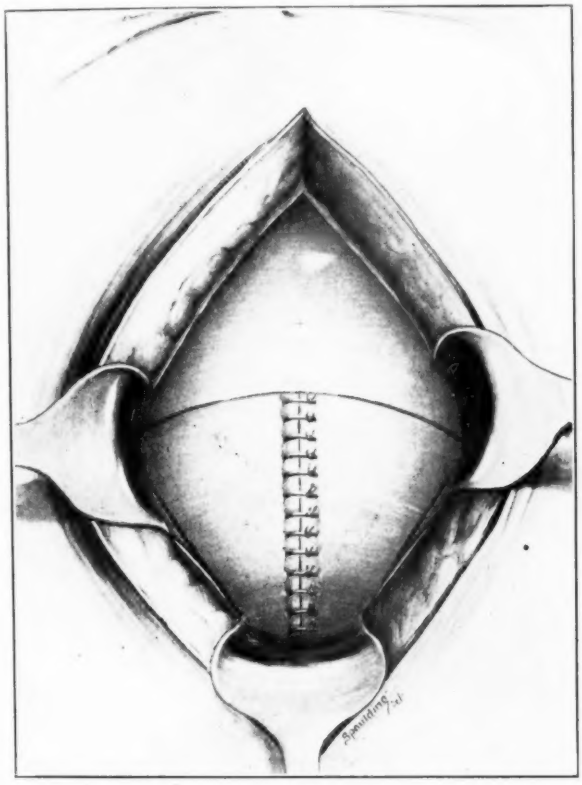

Fig. 4.—Low or cervical cesarean section. The cervical incision is sutured in one layer, with interrupted sutures of No. 2 chromic catgut. The upper flap of peritoneum is brought down but not anchored in any way to the uterus.

which were free from complications. This was due partly to the type of operation used and partly because they were done at the time of election or at the onset of labor, and had intact membranes, and no vaginal examinations. Gaseous distention was not a troublesome factor in any of the cases.

In this series of 41 repeated operations 42 babies were delivered. One patient had heterologous twins. Two of the infants were macerated at birth, one was a second, and the other a third child. All those who were born alive survived.

DELIVERIES THROUGH THE PELVIS FOLLOWING THE CERVICAL CESAREAN SECTION

Four women were delivered through the pelvis following the cervical cesarean section. The first had had a hysterotomy for a complete placenta previa and she subsequently had three normal deliveries, the last one taking place on August 18, 1926. Her baby weighed 9 pounds, 5 ounces. The second had been delivered abdominally for ablatio placentae; two years later she had a normal delivery of a child weighing 9 pounds, 12 ounces, after a labor lasting eleven hours, thirty minutes. The third had had a cervical cesarean for cephalopelvic disproportion. Her second child being premature and smaller than the first, she was delivered by forceps after eight hours of labor. The fourth delivered through the pelvis deserves special mention since she illustrates how much strain may be put on a cervical scar without damage. This woman had had a Veit-Fromme-Hirst cesarean on May 7, 1921, for a flat pelvis, and a floating head after a long labor. The

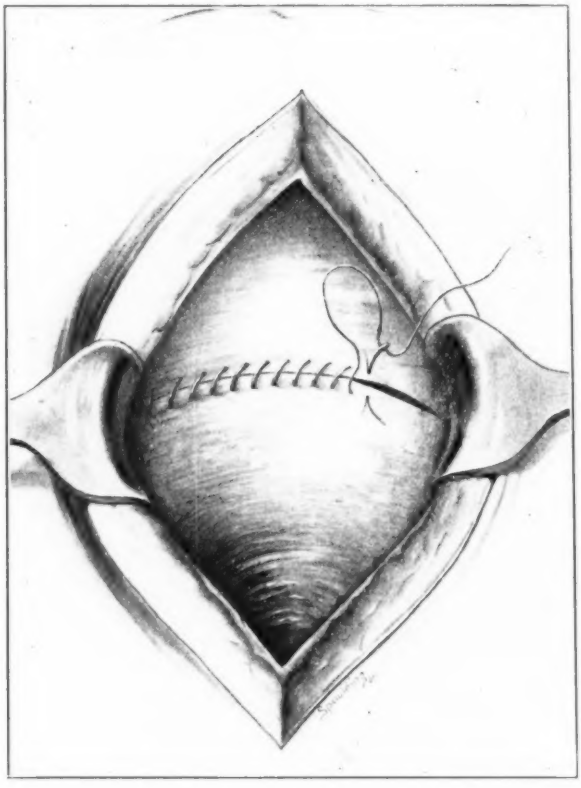

Fig. 5.—Low or cervical cesarean section. The operation is completed by uniting the flaps of peritoneum, upper and lower, with a continuous suture of fine chromic catgut. The flaps are not attached to the uterus so as to facilitate the separation of the bladder in subsequent operations.

convalescence was uneventful and both mother and baby were discharged well. She was followed at the prenatal clinic during her second pregnancy and instructed to come to the hospital with her first pains. She disregarded these instructions and was admitted with full dilatation of the cervix and with the vertex presenting at the level of the ischial spines. A right episiotomy was performed and she was delivered of a female child by forceps on November 23, 1923. On account of her hard labor it was decided to keep her in bed an extra week in order to further protect the cervical scar. On the eighth day in the puerperium she got out of bed for the first time, dressed and walked home. All attempts to keep her in the hospital were futile. Her cervical scar had been put to a most severe test, and yet, when she was examined at the clinic a month later nothing abnormal was found.

CERVICAL CESAREAN SECTION AFTER A PREVIOUS CLASSICAL SECTION

A previous classical cesarean section is not a contraindication to the cervical operation. In my series thirteen low operations were performed on women previously delivered by a classical section. In these the Veit-Fromme-Hirst technic was followed five times, and the Sellheim eight times. In these thirteen parturients the previous classical scars were discovered as depressions in the uterine body, but all were well healed.

One woman had had a cervical section for cervical dystocia resulting from a previous high amputation on May 13, 1922. On July 18, 1923, a supravaginal hysterectomy, leaving but a wafer of cervix, and double salpingo-oophorectomy were performed for bilateral ovarian cysts and severe uterine hemorrhages. The previous scar in this cervix could not be recognized and there were no abdominal adhesions.

Another patient had a low cesarean performed on May 21, 1923. On July 19 of the same year she had a laparotomy for appendicitis; no adhesions were seen in the pelvis.

In July, 1923, a woman upon whom I had performed a Veit-Fromme-Hirst operation was delivered by a classical section by another operator. The usual band of adhesions was found and the cervical incision was healed as far as could be seen without separating the bladder. It is interesting to note that this patient's first incision was septic, a uteroabdominal fistula had formed, and that drainage had taken place through the abdominal wall. The fistula had closed spontaneously.

CONCLUSIONS

From a series of 41 repeated cervical cesarean sections the following conclusions may tentatively be drawn.

1. Perfect healing of the cervical scars and the impossibility to locate the previous line of incision.

2. Definite protection against rupture in subsequent pregnancies and labor.

3. Delivery through the natural passages is possible in many parturients if no disproportion exists. This applies to cases where an abdominal delivery for a relative indication existed with a previous pregnancy. Four patients delivered through the pelvis after a cervical cesarean, one of them three times.

4. The dictum "once a cesarean always a cesarean" does not necessarily hold with this type of operation.

5. The operation may be repeated with ease.

6. No difficulty was encountered in the separation of the bladder a second, third or fourth time with one exception, when the segment was firmly adherent to the abdominal wall and the uterus was entered extraperitoneally.

7. Pelvic adhesions are reduced to a minimum except where the Veit-Fromme-Hirst technic is employed, and even these adhesions do not interfere in performing a secondary cervical section.

8. Abdominal herniae were not observed in any of the 206 cervical operations which I performed.

9. The convalescence is more nearly that of a pelvic delivery, as the lack of handling of intestines reduces shock and distention to a minimum.

10. The protection again peritonitis is a definite factor in favor of the low or cervical cesarean section.

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395 COMMONWEALTH AVENUE.

LIPIODOL INJECTION OF THE UTERUS AND OVIDUCT*

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LIPIODOL is a definite chemical compound in which 40 per cent of iodine is firmly bound to poppy seed oil. As a result the lipiodol is nontoxic and noncaustic, and ordinary tests fail to reveal the presence of the iodine. The compound is thoroughly impervious to the

Fig. 1.—The patient, aged thirty-two, had been married ten years without being pregnant. The cervix had been dilated three times for sterility. There was a history of chronic appendicitis. The tubes were inflated in August, 1925, in the clinic, without pneumoperitoneum resulting. Repetition two days later was equally futile. Two weeks later the gas passed at a pressure of 160 mm. of mercury and two days later, at a pressure of 120 mm. The patient returned one year later still sterile. Inflation, after the administration of tincture of belladonna, was followed by the passage of the gas at a pressure of 48 mm.

The roentgenogram shows an anteverted uterus and both tubes well filled with lipiodol which can be seen escaping from the distal end of the left tube.

*Read before the American Association of Obstetricians, Gynecologists, and Abdominal Surgeons, Chicago, Ill., September 20-22, 1926.

Fig. 2.

Fig. 3.

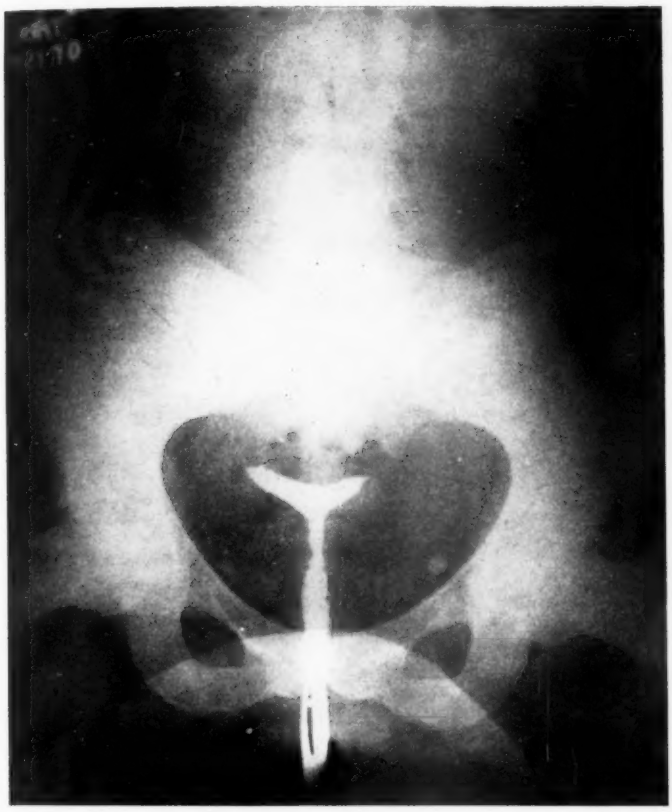

Fig. 4.

Fig. 2.—The patient, aged twenty-nine, had been married six and one-half years. One miscarriage had been followed by mild sepsis. No subsequent pregnancy had occurred. Tubal inflation, elsewhere in 1925, was followed by transient pelvic peritonitis. On examination no gross pathologic change was found. The cervix was apparently normal. Tubal inflation carried out twice with a maximal pressure of 200 mm. was futile.

The roentgenogram shows the anteverted uterus well filled with lipiodol and both oviducts filled to the fimbriated end where clubbing is present. There is some lipiodol in the peritoneal cavity.

Fig. 3.—The patient, aged thirty-five, had been married eight years without pregnancy. Peritonitis had followed rupture of an abscess in the left side of the pelvis at the age of thirteen. Dilatation and curettage had been carried out at the age of thirty-two. On examination the uterus was found acutely anteverted and the left adnexa palpable. The Rubin test showed no gas passing at 200 mm. The patient complained of some distress on the left side but none on the right.

The roentgenogram shows the uterus pulled to the left and well filled with lipiodol. The left tube is tortuous and filled in the proximal two-thirds; some lipiodol is evident in the region of the fimbriated end. The right tube contains no lipiodol and there is none in the peritoneal cavity.

This patient was operated upon after returning home and the pathologic findings corresponded to the preoperative conclusion.

Fig. 4.—The patient, aged thirty-eight, had been married fifteen years and had had no children. There was no history of infection. The pelvic examination was essentially negative. The first inflation showed the tubes occluded to 200 mm. pressure, and the second to 205 mm.

The roentgenogram shows a rather large uterine cavity well filled with lipiodol. The right tube is faintly filled for a short distance; the left tube is also occluded. There is no lipiodol in the peritoneal cavity.

Fig. 5.

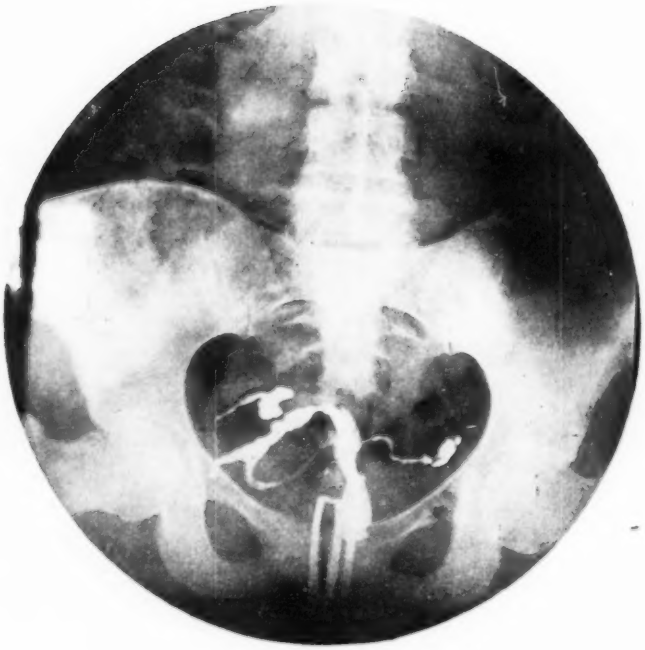

Fig. 6.

roentgen rays. Secard and Forestier employed it in 5,000 cases without trouble save in one case of brain tumor.

Before the advent of lipiodol, various substances were used to depict the cavity of the uterus and oviduct. The method of Kennedy

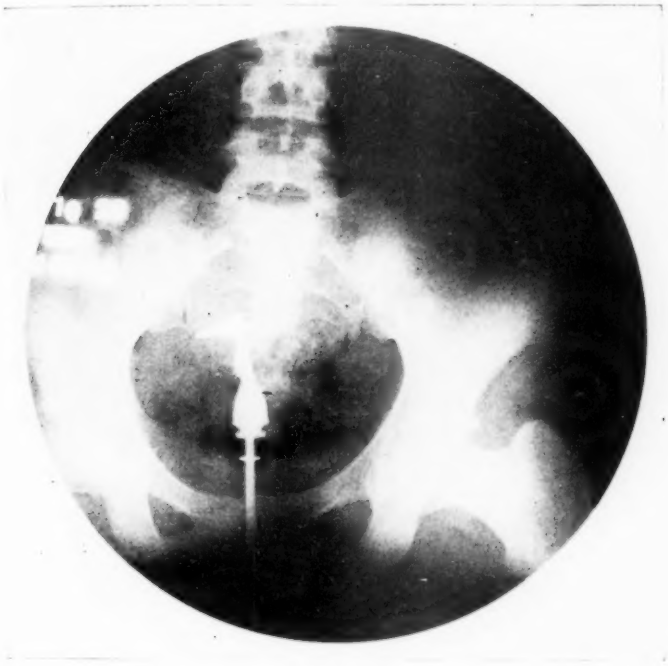

Fig. 7.

Fig. 5.—The patient, aged twenty, had been married four years. She had had one miscarriage at three months, following an automobile accident five months after marriage. Infection was not believed to have followed but convalescence was slow and operation resulted in the removal of a cyst from the right ovary, a suspension of the uterus, and appendectomy. On examination tenderness was found below McBurney's point. Palpation of the right adnexal region provoked considerable discomfort; otherwise the examination was negative. Patency of the oviducts was not established under a pressure of 200 mm.

The roentgenogram shows the body of the uterus well filled with lipiodol both tubes filled nearly to the distal end, the right more completely than the left. There is no lipiodol in the peritoneal cavity.

Exploration revealed both oviducts to be occluded in the fimbriated extremity by small calcareous nodules. The remaining portion of the oviduct seemed quite normal.

Fig. 6.—The patient, aged thirty-two, had been married nineteen years. Rheumatic fever at twelve had been followed by chorea. There had been moderate menorrhagia. The uterus was found to be rather large. Tubal inflation, repeated following the administration of tincture of belladonna, demonstrated occlusion.

The roentgenogram shows an anteflexed uterus with irregular contour of the cavity possibly due to fibromyomas. The fundus is septate; the tubes filled to the distal end and both are clubbed. There is no lipiodol in the peritoneal cavity.

Fig. 7.—The patient, aged twenty-seven, and five years married, complained of marked obstructive dysmenorrhea. Appendectomy had been performed nine months previously, at which time exploration of the pelvis had been negative. Dilatation had been carried out five years before for dysmenorrhea and sterility. Two years later it was repeated with curettage. Ovarian extract taken for three years had ameliorated the dysmenorrhea. Thyroid extract provoked cardiac symptoms and was discontinued. The pelvic examination revealed nothing but a rather small uterus. Inflation of the tubes showed occlusion under 200 mm. pressure.

The roentgenogram shows the uterus well filled and inclining to the right. The cornua are distended with the lipiodol but neither tube fills. There is no lipiodol in the peritoneal cavity.

Fig. 8.

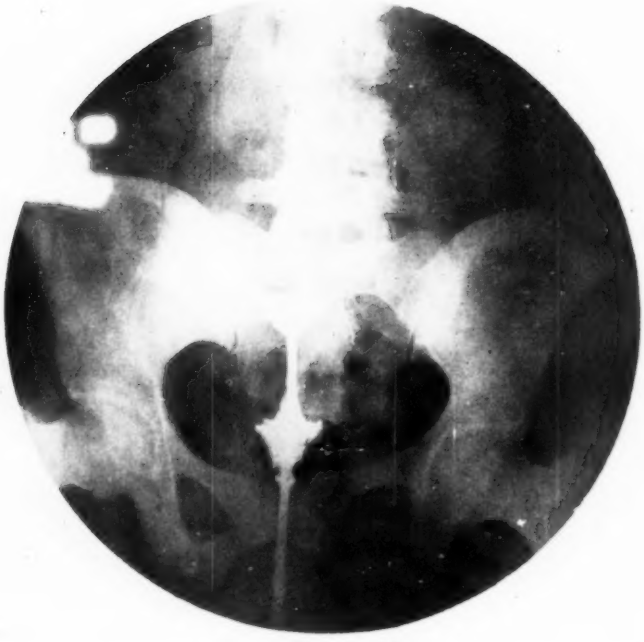

Fig. 9.

with sodium bromide suffers only in the lack of clearness of the resulting picture.

Accurate knowledge of the condition of the fallopian tube is necessary to the complete examination of every sterile woman. A careful pelvic examination followed by the Rubin test are the first steps, but they do not definitely determine the point of obstruction, and the

Fig. 10.

Fig. 8.—The patient, aged twenty-eight, had been married ten years. Left tubal pregnancy had been followed by salpingectomy in 1921. There was no history of infection. Pelvic examination showed slight fixation of the uterus which was drawn to the right. A single tubal inflation with a maximal pressure of 200 mm. showed no gas passing into the peritoneal cavity.

The roentgenogram shows the uterus well filled, the fundus broad and inclining to the right, and the cornua distended. The left tube is either absent or occluded at the uterine end. The right tube is tortuous but filled to the fimbriated end where clubbing occurs. There is no lipiodol in the peritoneal cavity.

Fig. 9.—The patient, aged thirty-three, had been married eight years. There was no history of infection. The cervix had been dilated for sterility two years previously. On pelvic examination the cervix was found to be split transversely. Tubal inflation revealed occlusion under 200 mm. pressure.

The roentgenogram shows a good-sized uterine cavity well filled with lipiodol. The left tube is apparently stenosed and fills about half way to the distal end; the right tube fills about one-third of its length and is also stenosed. There is no lipiodol in the peritoneal cavity.

Fig. 10.—The patient, aged twenty-five, had been married five and one-half years. Twin pregnancy one year after marriage had been followed by uneventful convalescence. Miscarriage induced six months later had been followed by pelvic inflammation, since when pregnancy had not occurred. Pelvic examination showed nothing more than mild cystic cervicitis. Inflation of the tubes did not permit the passage of gas into the peritoneal cavity.

The roentgenogram shows the uterus well filled, with rather a broad fundus. Both tubes are filled to the fimbriated end. Left hydrosalpinx is evident. The right fimbriated end is clubbed. There is no lipiodol in the peritoneal cavity.

prognosis of operative treatment remains uncertain. Lipiodol roentgenograms permit more accurate prognosis in cases of tubal occlusion.[3] In the majority of cases of closed oviduct this will be unfavorable, but many patients will be dissuaded from submitting to fruitless operation. In a small percentage of these cases, plastic operation on the closed tube carries with it a reasonable possibility of success. To make the operation justifiable, the site of obstruction should be determined. It usually occurs either in the interstitial portion of the tube or at the fimbriated extremity. If in the former site, operation is

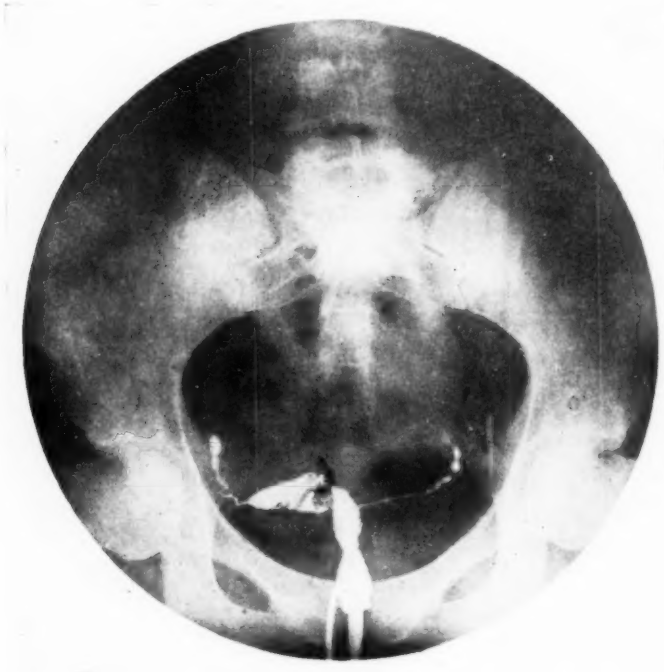

Fig. 11.—The patient, aged twenty-six, had been married three years without pregnancy. There is no history of infection. Pelvic examination was negative. Tubal inflation showed no gas passing under 200 mm. pressure.

The roentgenogram shows the uterus well filled and anteverted and both tubes filled to the distal end but the solution is retained in the clubbed fimbriæ. On the left side a small amount has escaped into the peritoneal cavity.

well dispensed with; in the latter, however, operation is sometimes feasible.

Roentgenograms taken following the injection of the cavity of the uterus and oviducts with lipiodol indicate a sharply limited field for the operation of salpingostomy in the treatment of sterility in women. The disrepute into which this operation has justly fallen is in part explained by the entire lack of preoperative information concerning the site of obstruction in the oviduct. No doubt most closed tubes are not amenable to surgical treatment. The extent of the pathologic change in the fallopian tube cannot be accurately determined by

bimanual palpation or by the Rubin test alone. It is neither fair to the patient to refuse operation if there is a reasonable chance of success, nor is it justifiable to employ surgical measures blindly or without securing all available data before operation. Lipiodol injection affords a method of depicting the oviduct and increases our ability to select the candidate for operation properly. If the injection is performed with strict asepsis and the contraindications of the Rubin test kept in mind, no untoward results need occur. It should not be employed as a substitute for the Rubin test and is best limited to those patients in whom occlusion has been revealed by tubal inflation.

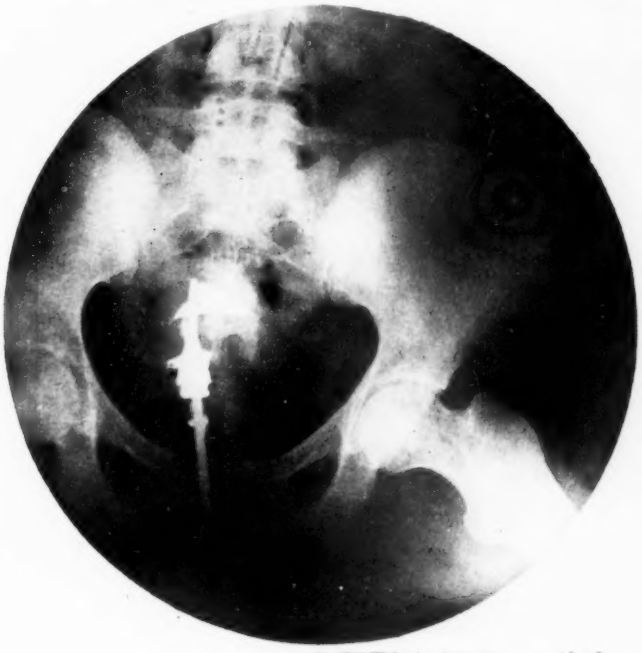

Fig. 12.—The patient, aged twenty-four, had been married four years without pregnancy. There was no history of pelvic inflammation. Tubal inflation under a pressure of 220 mm. showed no gas passing into the peritoneal cavity. No better result followed inflation after the administration of tincture of belladonna.

The roentgenogram shows the uterus of normal size and well filled with lipiodol. The oviducts admit the lipiodol for only a short distance; there is none in the peritoneal cavity.

Before investigation has been completed, the fertility of the male must be established and all other reasons for the sterile marriage excluded.

The contraindications to the use of lipiodol are identical with those governing tubal inflation. The injection is carried out under aseptic precautions in the operating room and should be preceded by at least one carefully performed Rubin test. It is preferable to repeat the inflation, however, after administering tincture of bella-

donna to rule out the factor of spasm. This being done, the closure of the oviduct can be fairly attributed to the pathologic change and the lipiodol may be injected twenty-four hours later.

TECHNIC

The tehnic is simple and apparently accurate. A 10 c.c. Record syringe is used and the ordinary inflation cannula fitted to it. Ten c.c. is ample for an injection, the average amount used being 5 to 6 c.c. The cervix uteri is caught with a tenaculum after being exposed with a bivalve speculum. The cervical canal is thoroughly cleansed with dry cotton applicators after which tincture of iodine is applied and wiped dry. The cannula is inserted after all air has been expelled from the syringe and cannula. Gentle pressure is made on the plunger until the patient complains of uterine colic. Pressure is then released for a moment and reapplied until the same reaction occurs. This is repeated once more and the picture taken with the cannula still in place.

Roentgenograms of the pelvis are made with the patient in the same position as for the injection, care being taken to see that she does not move or breathe during the exposure. I have found it most convenient to use an ordinary bedside unit for it is then unnecessary to move the patient and there is no danger of escape of the lipiodol from the cervix. Roentgenograms by this method have been uniformly successful. Should there be any question of lipiodol in the peritoneal cavity, roentgenograms should be taken again twenty-four hours later.

RESULTS

Lipiodol has been used for the last six months in the Mayo Clinic and during this time the Rubin test was made in eighty-five cases. In eighteen of these women with closed oviducts, the tubal inflation was followed by lipiodol injections and roentgenograms.

On the basis of the findings in roentgenograms following the injection of lipiodol, six of the eighteen women mentioned might expect success from operative treatment, if the tubal condition alone were considered. One of these was refused operation because the husband's Wassermann test was positive. Another had a fibroid uterus which was believed to prejudice her chances. Of the remaining four, two have been operated on, one at the Mayo Clinic and the other elsewhere. The former is now four months' pregnant. In both of these cases, the pathologic changes evident at operation confirmed the preoperative diagnosis made by roentgenogram.

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PUERPERAL INFECTION DUE TO ANAEROBIC STREPTOCOCCI*

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IN STUDYING patients with puerperal infection we were frequently impressed with the fact that in cases in which there could be no doubt about either the uterine or blood stream infection, the bacteriologic examinations were negative. As a result of this experience we felt that both uterine and blood cultures should be incubated both aerobically and anaerobically. This work has now been carried on since July, 1924, when the Obstetrical Service took over its own bacteriologic work.

We reported in a preliminary paper our experiences with anaerobic organisms at the meeting of the Southern Medical Association in November, 1925. In this article we reviewed particularly the previous work of Schottmüller in detail. We were surprised to find that up to that time there had been little or nothing written in the English and American literature about the rôle of anaerobic streptococci in puerperal infection. In our preliminary report concerning infections due to anaerobic streptococci we were able to confirm all of Schottmüller's statements regarding the characteristics of these infections, although our experience at that time was still limited. In this short period of time anaerobic streptococci played the greatest part by far in our cases of puerperal infection. We were surprised at this finding because we had felt, like others, that Schottmüller's experience was perhaps exceptional and that these organisms played only an unimportant part in the incidence of puerperal infection.

It is our object in this paper to present our experience with these infections up to this time, which covers a period slightly more than two years. It may be well to mention first the description that Schottmüller gives of the organism which he terms the Streptococcus putridus, which is an anaerobic streptococcus. Before doing this, we wish to state that in many of our cases we isolated this specific organism, but there are other types of anaerobic streptococci which we have encountered which are *also* able to produce pathogenic lesions, but do not do this to the degree which the organism which Schottmüller describes.

*Read at the Thirty-ninth Annual Meeting of the American Association of Obstetricians, Gynecologists, and Abdominal Surgeons, held in Chicago, Ill., September 20-22, 1926.

In 1910, in his first paper, Schottmüller reported a total of twenty-five cases, with a mortality of thirteen, or 50 per cent. Seventeen cases of puerperal infection, with seven deaths, or 41 per cent. In cases of puerperal thrombophlebitis due to anaerobic streptococci, he reported a mortality of 78 per cent. He indicates that the anaerobic streptococcus is a virulent pathogenic organism and cannot be regarded as a parasite, because once having invaded the thrombi or blood stream it has pathogenic properties. His description of the organism is as follows: On artificial culture media it forms long and short chains. The individual organisms are usually not round but flattened and lie opposite one another (diplococci); eight, ten, or more diplococci form at times a tortuous chain. The single cells do not always have the above described forms but at times on cultures they become rod-shaped and all diffent shapes, so that one is forced to believe that the culture is contaminated. They stain readily and are gram-positive. The organism does not grow in the presence of oxygen, but on the contrary, it is so sensitive that it grows only after expulsion of all the oxygen. For this reason only those methods can be used in which all the oxygen is removed and kept away. These requirements are best met in agar. The usual mixture of a stab culture to which a reducing substance has been added is the best media on which to grow this streptococcus.

Since 1903 Schottmüller has been successful in obtaining this organism in the blood from a number of serious cases of puerperal infection. The blood was placed immediately in bouillon and without further handling, in the incubator. In this apparent aerobic condition streptococci grew, but on broth cultures were obligate anaerobes. Naturally they were anaerobic from the start and the growth in the broth was only apparently aerobic. The anaerobic character of these cultures, although apparently under aerobic conditions, was due to the fact that the venous blood which quickly clotted or settled to the bottom excluded the oxygen from the cocci so that they found excellent growth conditions. Growths are obtained in twenty-four hours and a much better growth is seen in forty-eight hours in the anaerobic zone of the agar tubes.

The Streptococcus putridus, as Schottmüller has named this organism, causes a putrid odor, particularly in blood bouillon cultures. The blood takes on a characteristic poppy-red color and in the spectrum one can demonstrate hydrogen sulphide. In about ten days the blood cultures are black in color. The last described property of the Streptococcus putridus is exceedingly characteristic. The pus or blood in which the Streptococcus putridus is growing always has a foul odor which is due to the formation of hydrogen sulphide.

His experience shows that the Streptococcus putridus infections most frequently follow abortions. He feels that this indicates that in abortions the organisms are introduced into the uterus either with the hands or with instruments. He emphasizes that most of these abortions were criminal and the infection of the uterus from the vagina is self-evident. He states that the occurrence of anaerobic streptococci in the normal vagina has been proved and therefore autoinfections can occur. The subsequent invasion of the uterus is also

possible, and fatal autoinfections of Streptococcus putridus can occur. He points out that in abortions only 3 per cent die, which indicates that the uterus in early abortion is not so easily infected as at term. The thrombosed vessels in the endometrium at term are much more numerous and larger. Naturally the mortality is higher in these patients. He feels that the site of entrance of the Streptococcus putridus in these cases of thrombophlebitis is always by way of the endometrium. Here the organism invades the uterine wall, parametrium and thrombosed veins. The thrombosed veins in contradistinction to the circulating blood, offer a fine culture medium. The proliferating organism dissolves the thrombi and small particles break off and gain access to the blood and other organs, particularly the lungs.

The work of Schottmüller was confirmed on a small scale by several workers before the onset of the World War. In 1921, an article appeared from the Schottmüller Clinic by Bingold, in which the pathogenicity of the Streptococcus putridus was further emphasized. The extent to which this work has now been carried out at the Schottmüller Clinic is very clearly brought out in a monograph by Schottmüller on cultural methods, which was published in 1923. This shows that in 231 fatal puerperal cases following labor the streptococcus putridus was present 72 times. In 41 of these cases death was due to peritonitis. The Streptococcus putridus in this series was present seven times in mixed infections. This is in marked contrast to the experience following abortions. In 600 cases of infected abortion the Streptococcus putridus was found only 4 times in pure culture and 300 times in mixed infections.

It is the object in this paper to point out the frequency with which we have met with anaerobic streptococci and to illustrate some of our typical cases from a pathologic and bacteriologic standpoint. We

TABLE I

RESULTS OF CULTURES FROM PUERPERAL PATIENTS

NUMBER OF CULTURES	NUMBER OF CASES	NEGATIVE CULTURES	POSITIVE CULTURES					
			AEROBIC			ANAEROBIC		
			NUMBER OF CULTURES	NUMBER OF CASES	NUMBER OF MIXED CULTURES	NUMBER OF CULTURES	NUMBER OF CASES	NUMBER OF MIXED CULTURES
Blood 200	68	146	15	6		39	11	
Uterine 60	54	8	12	12		35	35	1
Pelvic abscesses 10	10	1	2	3	1	4	6	2
Peritoneal 8	7		2	2		5	5	
Post-operative wound infection 9	9		3	3		5	6	1
Urine 20	18	4	12	12		2	3	1

TABLE II

TYPES OF PUERPERAL INFECTION

NUMBER OF ADMISSIONS JULY 1, 1924, TO SEPT. 1, 1926		NUMBER OF DELIVERIES		NUMBER OF CASES OF PUERPERAL INFECTION		NUMBER OF DEATHS
2194		1913		45		10
TYPE OF INFECTION	NUMBER OF CASES	AEROBIC BACTERIA	ANAEROBIC STREPTOCOCCI	MIXED BACTERIA	NEGATIVE CULTURES	MORTALITY
Acute endometritis	42	11	27	3	1	0
Pelvic cellulitis	11	4	6	1		0
Peritonitis	7	1	4	2		6
Pelvic abscess	3	1	1	1		
Pelvic thrombophlebitis	9	0	6	0	3	3
Bacteriemia	15	4	10	1		1

feel that we are in no position to definitely advocate any procedure as regards radical treatment in these cases, because we have been handling cases of this type entirely conservatively. Our present experience, however, has led us to a certain definite decision as to the method of handling these cases in the future. Our complete experience over a period of twenty-six months can best be appreciated by studying Tables I and II, which outline the bacteriology of our cases of puerperal infection. It can readily be seen from these tables that anaerobic organisms played a very considerable part in the cases of puerperal infection that we have studied during this time. In these tables we have not classified the various types of anaerobic streptococci which we have found but have placed them under one group.

These organisms vary somewhat in cultural characteristics and in the severity of the clinical lesions. The organisms, however, which answer the description of the so-called Streptococcus putridus of Schottmüller (anaerobic) which we have encountered, usually give rise to rather virulent infections, particularly if a thrombophlebitis develops with a resulting pyemia. The difference in the severity of these infections, particularly in cases of thrombophlebitis, apparently depends upon the degree of the ability of the organisms to digest thrombi. This property, we feel, influences the treatment of the case materially and we shall discuss this further, when taking up the treatment.

The anaerobic streptococci found by us were all obligate anaerobes, usually growing only on enriched media. They varied in size from 0.2 μ to 3 μ. The most common occurrence was in pairs with chain formation influenced by the media. Some tended to be pleomorphic. This is true particularly of the Streptococcus putridus. The majority recovered were gram-positive, although in old cultures there might be gram-positive and gram-negative organisms in the same chain.

We have not been able to classify the anaerobic cocci except roughly, using the proteolytic powers of the organisms as an index. Prevot has published a table, classifying them according to their

action on different types of media, but certain classes apparently overlap.

One organism in particular has been encountered very frequently by us. It is a very small, gram-negative anaerobic coccus (or coccobacillus). In a small series of eight obstetric patients it was found six times in the vagina and three times in the cervix. We have recovered it with certainty in twenty-two uterine cultures and nine blood cultures. This organism produces a black pigment on blood agar media, which is probably melanine. In pure cultures it produces little if any hemolysis, but in symbiosis with other organisms, particularly other anaerobic cocci, its hemolytic properties are tremendously increased. For example, in forty-eight hours a blood agar slant in its entire thickness will be completely decolorized. It may be that the marked blood destruction shown in some of our cases was due to this organism in symbiosis with others.

On examining the tables it will be seen that anaerobic streptococci were isolated from the blood in eleven cases as compared to six cases of other pathogenic organisms. The uterine cultures in thirty-five cases showed anaerobic streptococci, while twelve cases showed other aerobic pathogenic organisms. In comparatively few instances was there more than one organism isolated from uterine or blood cultures. Anaerobic streptococci were recovered in six cases of pelvic abscess and five cases of peritonitis. During the period of our study there were ten deaths which occurred in our cases of puerperal infection. Five cases were due to anaerobic streptococci which were recovered in pure culture. Anaerobic streptococci were found in three other fatal cases, but associated with other organisms. Three of the deaths were due to thrombophlebitis with resulting pyemia, and in one instance there was a severe case of peritonitis which terminated very rapidly. These latter four cases are described both by chart and case histories as well as by pathologic material. Two of these cases we reported in a previous paper. In our series one case which developed lung involvement due to a thrombophlebitis and pyemia recovered and we have included this case in our descriptions.

In reviewing this work we are of the opinion that anaerobic streptococci play a considerable part in puerperal infection. The infection caused by this organism in most instances remains confined to the endometrium. We feel, in our experience, that fewer of these cases developed thrombophlebitis because they were rather promptly treated in respect to their uterine lesion. In any case where there is a profuse foul-smelling discharge we have made it a point at the time we obtain our uterine culture to remove retained secundines or clots by digital means or by the use of a blunt curette, followed by a 1-4000 potassium permanganate douche. We feel that early in these infections the organism is rather superficial and by removing the dead

material on which it can grow we have done much to prevent the spread of this infection.

In our cases of thrombophlebitis we had hoped, on account of the saprophytic character of the organism in the noninvasive state, that the virulence of the organism might become exhausted and we felt that by supporting the patient with frequent large blood transfusions and keeping up her nutrition by forced feeding the infection would at length terminate favorably. Four cases have been handled in this manner, with one recovery. We had expected better results since from time to time we have had rather gratifying results in both local and general infections due to the Streptococcus hemolyticus. Ligation of the internal iliac veins as well as the ovarian veins, as at first suggested by Bumm, was carried out in a number of cases in Schottmüller's Clinic. The results were not gratifying. Perhaps the conditions under which the ligation was carried out were not good.

The whole subject of operative treatment in puerperal thrombophlebitis and pyemia was reviewed in an excellent paper by C. Jeff Miller in 1917. He collected 197 cases from the literature. Fifteen were treated by extraperitoneal and 182 by transperitoneal operation. The gross mortality was 51.6 per cent. What he terms the corrected mortality was 33 per cent. In a discussion of this paper, Barton Cooke Hirst of Philadelphia stated that he was of the opinion before hearing Dr. Miller's paper, that by ligation of the pelvic veins no advantage could be gained. The mortality with this operation has been very discouraging. After hearing Dr. Miller's paper, however, the record was much more favorable than he had expected. He stated that after carefully considering the subject and reading what literature was available, he regarded the matter as a thing adjudged and practically dismissed it from his mind, but after hearing the scholarly address of Dr. Miller he felt that he would be compelled to take up the consideration of this subject once more. He was not convinced that this procedure could be advocated but was much more open to conviction after hearing Dr. Miller's paper.

In 1922, Baldwin, before this Society, reported his results in operative treatment of puerperal infection. He reported 67 cases, with 47 recoveries. He treated these cases by hysterectomy and with free drainage of the infected veins. His series, however, was not limited to cases of pelvic thrombophlebitis, but rather pelvic infection in general and therefore does not come under the present discussion.

We have come to the definite conclusion that we shall in future cases of pelvic thrombophlebitis due to anaerobic organisms, particularly the Streptococcus putridus, attempt ligation of all pelvic veins. If the patient's condition justifies further procedure we shall remove the infected uterus with the tubes and ovaries, both to remove the infection of the uterus and to limit the degree of pelvic edema which

results from ligation of this kind. The point and the time at which to ligate has puzzled us considerably as we have had it under discussion in all of the cases of our present series. We feel now that if the best results are to be obtained from such a procedure, it must be done

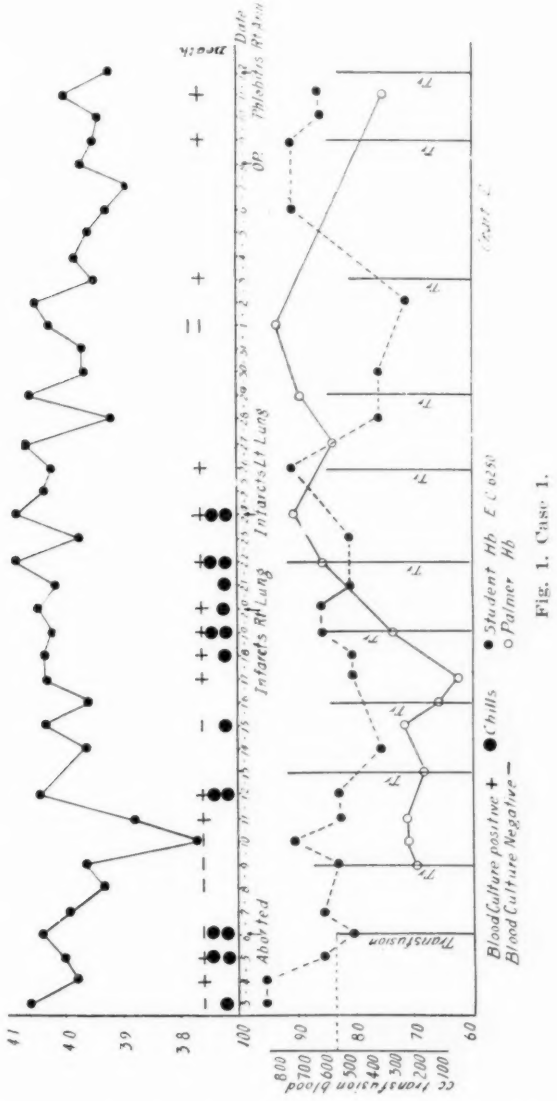

Fig. 1. Case 1.

as soon as the organism has been recovered from the blood stream in connection with a chill. We also feel that it is important to cleanse the uterus early in the manner previously mentioned, in all cases which have a profuse foul discharge. In this manner, we think we can in great measure prevent the spread of this infection to the deeper structures.

We have also observed that the infections from these organisms occur after full-term labor in cases where there has been a long drawn-out labor, or delayed labor, particularly in cases where the

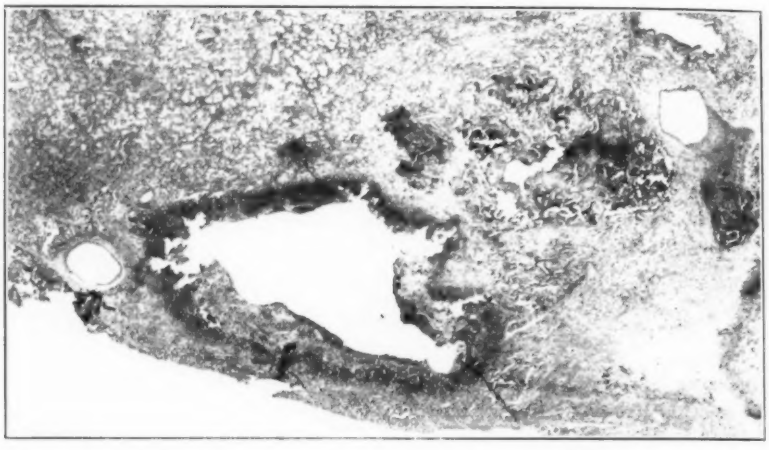

Fig. 2.—Case 1. Section of right lung showing numerous small lung abscesses. The largest cavity in the picture shows a marked destruction of tissue in the center cavity lined by a definitely pyogenic membrane around the periphery.

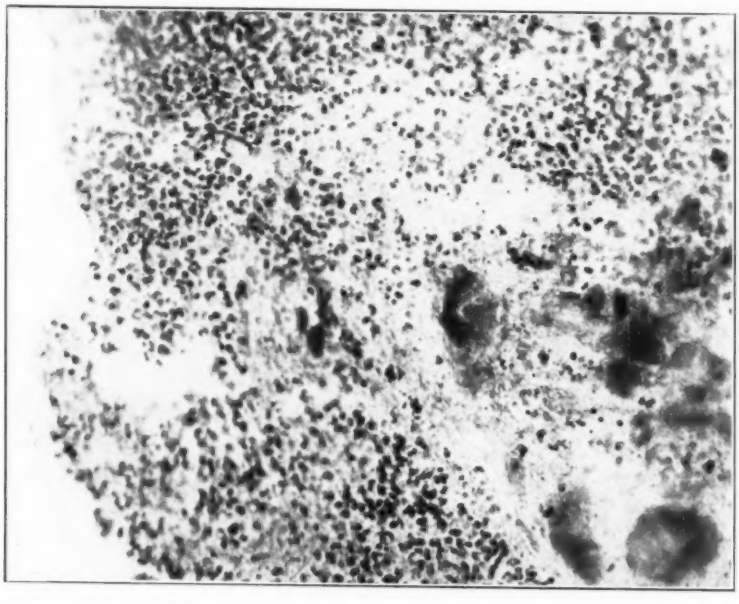

Fig. 3.—Case 1. Shows high power of pyogenic membrane of largest cavity of Fig. 2. The large dark areas in the lower portion of the picture indicate large groups of bacteria.

membranes have been ruptured either early in labor or previous to this time. Also that these cases appear almost entirely on our ward service in patients of the less clean type. It has been demonstrated

by Wegelius and others that the vagina frequently harbors anaerobic streptococci and we felt from the incidence of these infections and the absence of infections due to other pathogenic organisms in our series indicates that the patient is harboring these organisms herself. We also wish to emphasize that in many of these cases we have performed rectal examinations and believe that if such organisms are present in the vagina we are more apt to contaminate the uterus by rectal examination than by direct examination of the cervix through the vagina.

We feel that the proper incidence of various types of infections in the puerperium can only be determined by a careful bacteriologic study. The making of uterine and blood cultures in suspected cases,

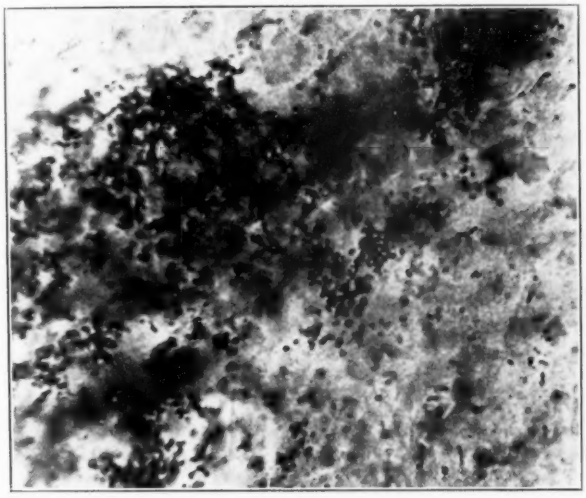

Fig. 1.—Case 1. Oil immersion of Fig. 3. Anaerobic streptococci well shown in this field.

particularly of thrombophlebitis, will give better indications what case should be ligated and at what time. In this way much may be done to improve the only fairly satisfactory figures which have been reported thus far.

Technic for Cultures.—The routine which we have established in uterine cultures is briefly as follows: the patient is placed crosswise on the edge of the bed and the genitalia are thoroughly cleansed and dried. They are then painted with picric acid solution, or 2 per cent mercurochrome solution. Preferably a weighted speculum is placed over the posterior vaginal wall and a flat anterior speculum is inserted. The vaginal portion of the cervix, the external os and a short portion of the cervical canal are carefully dried and painted with an antiseptic solution, again dried, and a Little's tube (usually two culture tubes are taken) is then carefully inserted into the uterus and the lochia aspirated. The tube is sealed, taken directly to the laboratory, and the contents transferred to: (1) blood agar plate; (2) anaerobic blood agar slant; (3) meat tubes, tubes containing meat and broth which

have not been filtered. (The third method was suggested by Dr. Howard Bell, formerly of the Department of Pathology.)

Blood Cultures.—We use 100 c.c. of veal infusion broth containing 0.1 per cent glucose. This is kept in 200 c.c. Florence flasks which have been covered with cotton and paper to prevent contamination. We take from 10 to 20 c.c. of blood, preferably the latter, and add it to the broth. The latter is again covered and placed in the incubator and not shaken. Blood cultures are preferably taken during, or immediately after a chill; or if there are no chills, at the height of the temperature. They should be taken frequently. Schottmüller recommends 300 x 50 mm. tubes (we use 210 x 27 mm.) which are then filled with 2 per cent glucose agar to which he adds 10-20 c.c. of blood, cools immediately and places in the incubator.

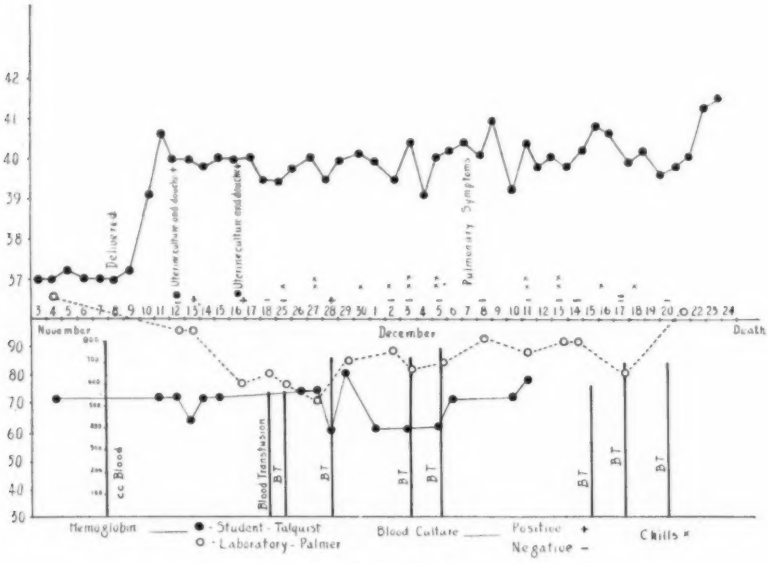

Fig. 5.—Case 3.

CASE HISTORIES

Case 1. (Fig. 1.) Patient entered hospital with a history of being three weeks overdue and of having inserted a slippery elm stick into the uterine cavity on Nov. 30, 1924 for about one minute. The following day she began to have fever. On Dec. 2, 1924 she had chills. Blood culture on Dec. 4, 1924 was positive, giving same organism as was recovered from uterus. Diagnosis of incomplete abortion, acute endometritis (Streptococcus putridus), pelvic thromboph'ebitis, bacteriemia (Streptococcus putridus), infarcts of lung, abscess of back and thrombophlebitis of veins of arm. She was treated with transfusions, mercurochrome and neoarsphenamine, but died Jan. 13, 1925 (44 days after introducing stick). Wbc. 10,000-25,200.

Autopsy.—The abdomen and pelvis were essentially negative. The entire lower lobe of right lung was firm and on section showed numerous infarcts and abscesses. Left lung showed at base an area of consolidation, which on section showed small abscesses. No definite sinus tract from right lung to scapular region, but right lung was densely adherent throughout and consensus of opinion was that abscess either resulted from rupture of empyema or was due to direct extension.

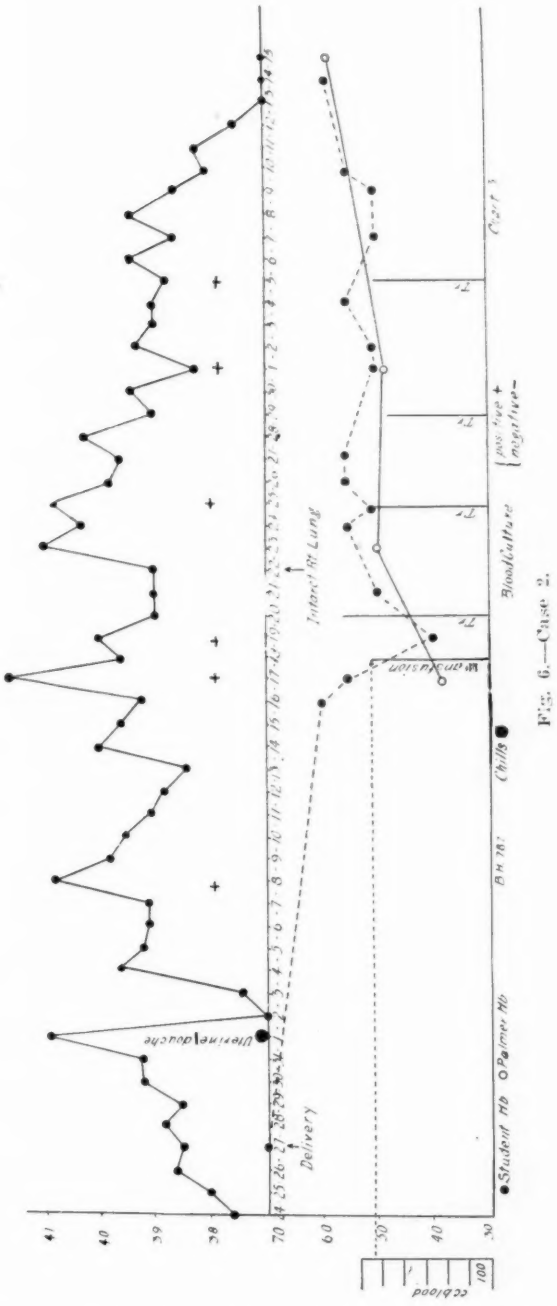

FIG. 6.—Case 2.

CASE 2. (Fig. 6.) Patient entered hospital Aug. 24, 1925, having irregular contractions. She was delivered on Aug. 27, 1925 of twins after labor of fifty-four hours, first by perineal forceps and second by version. Membranes had ruptured spontaneously some time on Aug. 25, 1925. Her temperature was 38° C. before delivery, and was normal for two days following uterine irrigation on Sept. 1, 1925.

Diagnosis of acute endometritis (anaerobic streptococcus), pelvic thrombophlebitis, bacteriemia (anaerobic streptococcus), and infarcts of lung. Treated with transfusions. Discharged well on Oct. 19, 1925, Wbc. 15,100-28,500.

CASE 3. (Fig. 5.) A gravida iii, entered hospital Nov. 3, 1925 for induction of labor. At term Dec. 12, 1925 from menstrual history. Uterus was the size of a full term gestation. Had a normal pelvis but had had a mild hypertension throughout pregnancy, with loss of weight during last month. On Nov. 8, 1925 patient went into labor following administration of castor oil and quinine. She was delivered of twins Nov. 8, 1925 after labor of three and one-half hours. First baby delivered spontaneously, second delivered by breech extraction. Temperature of 39.1° C. on Nov. 8, 1925, considered a pyelitis at first. On Nov. 11, 1925 a small indurated mass was palpated high up on right side in base of broad ligament. On

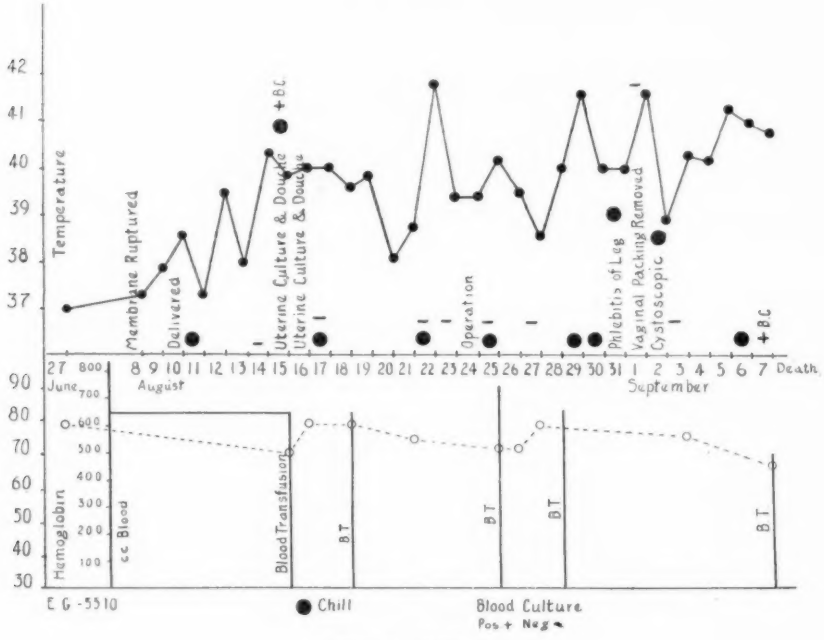

Fig. 7.—Case 4.

Nov. 12 an intrauterine culture and douche were carried out. Culture gave an anaerobic gram-positive diplococcus and a tiny anaerobic gram-negative coccus. Blood culture on same day after a chill gave anaerobic gram-positive diplococcus. On Dec. 7, 1925 patient had clinical signs and symptoms of pulmonary infarct. On Dec. 10 slight icterus was noted which progressively increased. On Dec. 18 a phenoltetrachlorphthalein test was normal. There was no urobilinuria although plasma gave a three-plus bile pigment test. In spite of frequent transfusions, intravenous glucose, and neoarsphenamine, patient died on Dec. 24, 1925.

CASE 4. (Fig. 7.) A gravida vii, due August 8, entered hospital on account of marked varicosities of the legs on June 21, 1926. She was kept in bed with legs elevated. Irregular contractions over a period of five days, beginning on Aug. 5, 1926. Membranes ruptured spontaneous fifty-one hours before delivery, with head not engaged. Delivery was spontaneous on Aug. 10, 1926. On Aug. 12 had marked abdominal distention. On Aug. 14 peritonitis was suspected and treatment instituted for that condition. On Aug. 16 a uterine culture was taken and a douche

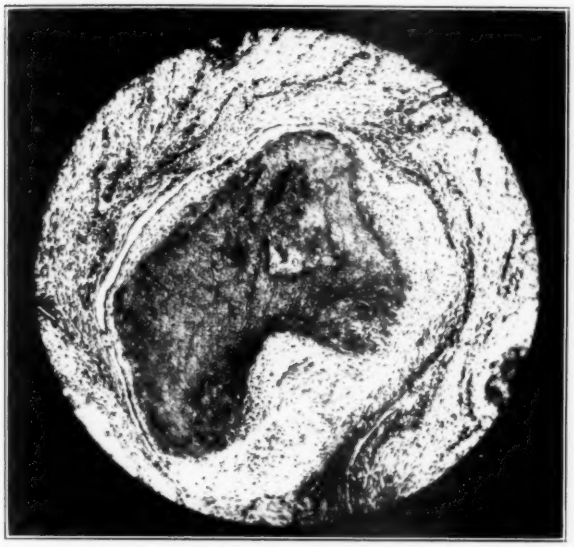

Fig. 8.—Case 4. Typical thrombosed vein, inner third of uterus. Well organized and showing moderate degree of invasion by leucocytes. Every vein in this region was thrombosed, indicating a very abnormal process.

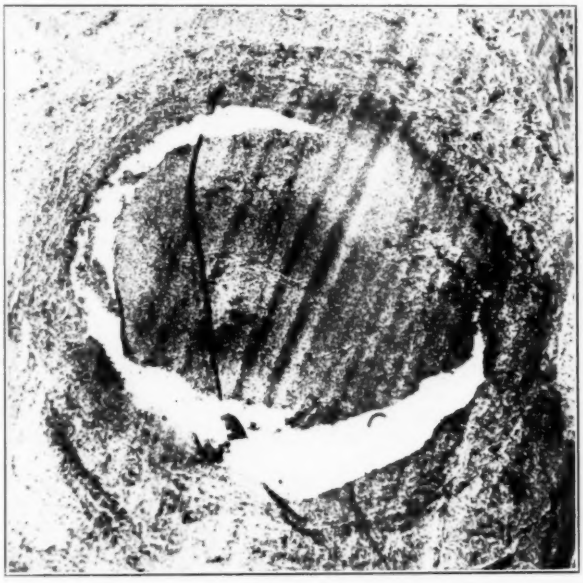

Fig. 9.—Case 4. Markedly infected thrombus undergoing digestion. Outer third of uterus, one-half right posterior wall, one-half cm. above supravaginal resection. Countless streptococci demonstrated by oil immersion.

given. Some induration and tenderness was found in left adnexa. On Aug. 18 a diagnosis of pelvic thrombophlebitis was made and in view of the positive blood culture (Streptococcus putridus) ligation of the pelvic veins was considered. In view of the patient's apparent good condition this was postponed until Aug. 24, 1926, when the uterus was removed. Ligation of the internal iliac veins was at-

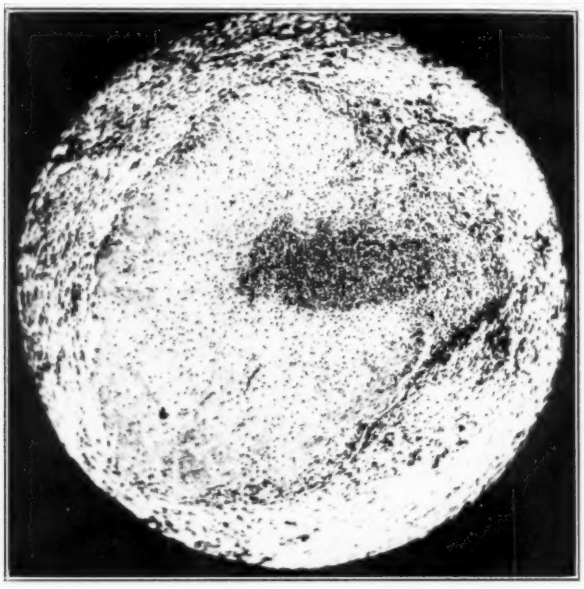

Fig. 10.—Case 4. Right posterior wall of uterus in region just above lesion of Fig. 9. Well organized thrombus, hyalinization. One area to left still showing a marked inflammatory process.

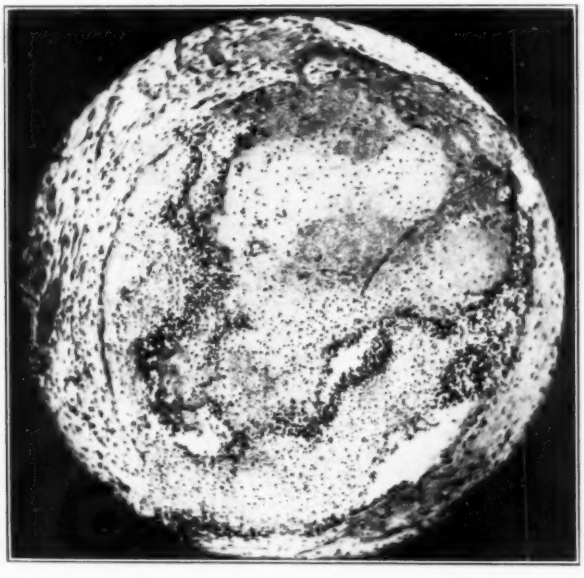

Fig. 11.—Case 4. Old organized thrombus undergoing dissolution as a result of marked inflammatory process still existing.

tempted but given up on account of a markedly dilated ureter together with induration. After removal of the uterus by supravaginal hysterectomy, together with removal of both adnexa, the cervix was split and the pelvis packed loosely with iodoform gauze. Sept. 1, 1926 a phlebitis developed in the right leg. On this day

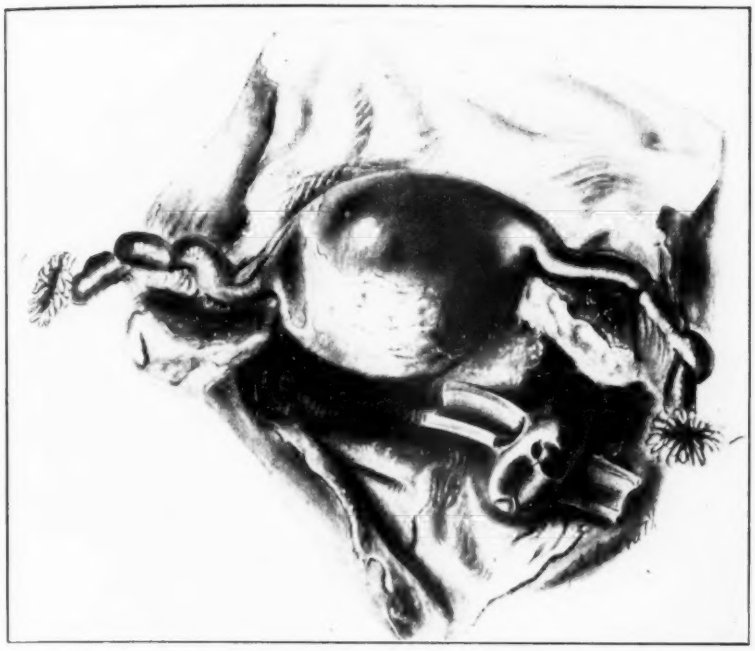

Fig. 12.—Case 5. Drawing from pelvic organs removed at autopsy. Posterior to the uterus is seen a large abscess cavity lined by fibrinous exudate. Rubber drainage tube in place, inserted through the vagina after culdesac drainage. Note how the exudate involves the sigmoid and intestines. Anaerobic streptococci of Schottmüller were predominant organisms in this case, and an unidentified anaerobic bacillus was also found. None of the well known pathogenic organisms were recovered in this case.

Fig. 13.—Case 5. Endometrium superficially shows fibrinous exudate, with many cells. Polynuclear cells comparatively few in number. Clumps of bacteria seen in exudate. Lower endometrium shows little reaction.

the packing was removed. Cultures of urine gave B. coli. Smear of urinary sediment gave a gram-positive streptococcus. The patient died on Sept. 7, 1926. Although râles were present throughout the course, definite clinical symptoms of lung infarcts were never noted. No general peritonitis after operation. Cultures from cavity, wall and a thrombosed vein gave a gram-positive streptococcus and also Streptococcus putridus.

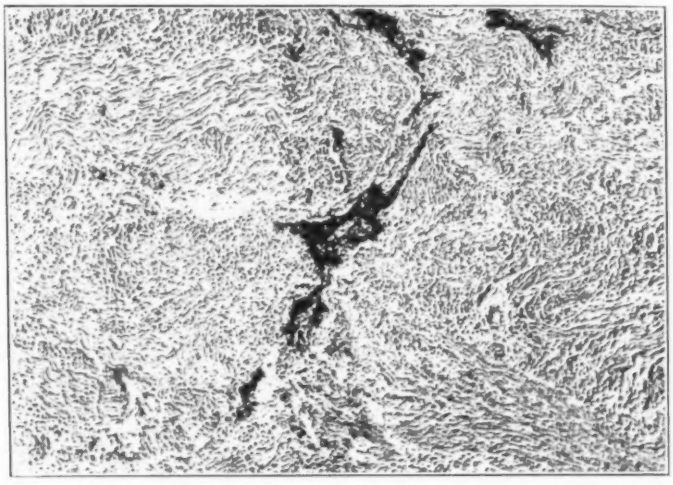

Fig. 14.—Case 5. Middle third of uterus showing lymphatics plugged with bacteria.

Fig. 15.—Case 5. Oil immersion of Fig. 14. Showing short chain streptococci.

Gross Description of Uterus.—Uterus removed by vaginal hysterectomy, measures 11x8x7 cm. in fixed state. On opening the uterus symmetrically it was found to be filled with a sanguinous exudate which was adherent in part to the placental site; the latter was elevated about 0.5 cm. above the lining of the cavity and had a ragged, greyish-yellow appearance. The lateral portion of the uterus showed no extensive thrombosis. Neither did the upper portion of the uterus show any gross evidence of extensive thrombosis or evidence of an inflammatory exudate. On cut-

Fig. 16.—Case 5. Outer third of uterus with peritoneal exudate.

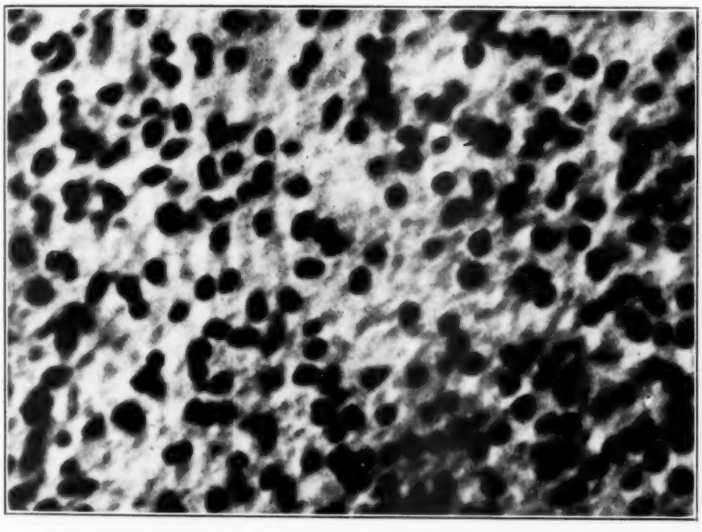

Fig. 17.—Case 5. High power of Fig. 16. Peritoneal exudate made up chiefly of fibrin and mononuclear cells and comparatively few polynuclear leucocytes. The absence of polynuclear leucocytes is explained by the peculiar ability of the anaerobic streptococci of Schottmüller to digest them.

ting through the placental site it was found to be studded with numerous thrombi in the small vessels as well as in the vessels with a diameter as great as 15 mm. In the lower posterior wall of the uterus near the midline just above the point of amputation was an abscess filled with purulent material, which measures ¾ cm., in diameter. In the adjacent tissue immediately surrounding the abscess for a distance

of 1 cm. on both sides the tissue is filled with numerous tiny abscesses varying in size from pin point to about 2 mm. in diameter.

Microscopic Examination.—Section through the placental site showed all veins filled with thrombotic processes in various stages of organization and with varying amount of infiltration with inflammatory cells. The veins of the inner third of the uterus at this point were also involved with the thrombotic processes. The uterine musculature in the upper portion of the uterus showed no evidence of inflammatory process, nor was there any evidence of peritonitis. There were collections of polymorphonuclear leucocytes found in some of the lymphatic vessels. This process was in no sense marked. The area on the posterior portion of the uterus just above the amputation in which numerous small abscesses were seen on section showed that these abscesses were limited to the thrombotic processes in the veins in this region. In some instances the vessel wall had been destroyed and the adjacent tissue was involved. The spread of the infection however in the uterine wall was not marked away from the process in the vein. There were other veins in this region in which the thrombotic processes in the vein had gone on to rather complete organization, but the infected character of the thrombotic process was still apparent from the marked amount of polymorphonuclear leucocytic infiltration. In this region of the uterus streptococci were found in the tissue in great numbers. The cultures both from the cavity of the uterus and from this abscess region showed the same organisms that were recovered at previous uterine culture and from the blood culture. Cultures from the cavity, wall and thrombosed vein gave a gram-positive anaerobic streptococcus as well as the Streptococcus putridus, the same organisms which were recovered from the blood.

Fig. 18.—Case 5. Oil immersion of similar fields of Fig. 16. Gram stain in tissue. Shows organisms throughout the exudate.

CASE 5. (Figs. 12 to 19 inclusive.) Patient entered hospital on Nov. 2, 1924 with a history of menses being about two weeks overdue, and of having inserted

douche nozzle into uterine cavity on Oct. 29, 1924. Twelve hours later she had abdominal cramps, with chills and fever. On Oct. 30, 1924, she began to vomit. Diagnosis of incomplete abortion, endometritis (Streptococcus putridus), peritonitis. Culdesac puncture on Nov. 4, 1924 with release of 100 c.c. or more of foul-smelling pus which contained same organisms as were recovered from uterus. Note at operation was that there was no "walling off" of the infection. Patient received in-

Fig. 19.—Case 5. Anaerobic streptococci of Schottmüller obtained from the blood stream. Smear from such a culture.

travenous mercurochrome and one blood transfusion but died the following morning, Nov. 5, 1924. Patient was dead one week after insertion of nozzle.

Autopsy Findings.—Suppurative endometritis of puerperal uterus, parametritis, septic thrombophlebitis, and acute general fibrinopurulent peritonitis, with pelvic peritoneal abscesses. Fibrinopurulent pleurisy, left.

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RECTAL ETHER ANALGESIA IN LABOR

Technic and Results in 5,800 Cases at the New York Lying-In Hospital*

By James A. Harrar, M.D., F.A.C.S., New York, N. Y.

FOR the past three years at the New York Lying-In Hospital we have been studying and extending the use of the Gwathmey method of rectal ether analgesia in labor. At the present time we are employing it in more than two hundred confinements each month and up to date have used it in 5,800 cases with very satisfactory results. By this we do not claim painless childbirth, but it gives relief to the agonizing part of the ordeal of labor.

The drugs required are morphine sulphate, magnesium sulphate, quinine and ether. One dose of a quarter of a grain of morphine is used hypodermically with 2 c.c. of 50 per cent solution of magnesium sulphate to prolong the action of the morphine. Half of the quantity of ether required for rectal anesthesia is dissolved in oil with 20 grains of quinine alkaloid, and a four-ounce mixture is instilled into the rectum as a retention enema at an interval following the morphine and magnesium sulphate injection. The ether is slowly and regularly absorbed over a period of several hours. The result in 85 per cent of cases was great relief of pain, and more or less relief in 10 per cent more.

Following the technic about to be described, we have seen no ill results to the mother, and the usual disadvantages of other methods of easing pain in childbirth,—perineal delay and asphyxia of the newborn child—are not in evidence. In comparison with the Freiburg "Dämmerschlaf," experience with which in 100 cases McPherson and I reported to this Society in 1914, we found the effect produced upon the mother's suffering very similar in typical cases; but with no inhibition of good bearing-down efforts in the second stage, and with no alarms regarding the respiratory condition of the child at birth. It was for these two reasons that we gradually abandoned the typical twilight sleep. Rectal analgesia especially takes the place of intermittent nitrous oxide gas anesthesia during the last few hours of labor. Being simple it can be used in the home without the service of a skilled anesthetist.

We will admit that many labors, especially in multiparae are easy and brief, and there is scarcely need, nor time, for the use of any

*Read at the Thirty-ninth Annual Meeting of the American Association of Obstetricians, Gynecologists, and Abdominal Surgeons, held in Chicago, Ill., September 20-22, 1926.

analgesic, but in a majority of labors the suffering of the mother demands relief. With only 4 per cent of negative results and no serious effects on the mother or child we recommend this method for a more extensive use in hospital and home confinements. The details of the standard technic which, though we may adjust it to the individual patient, we have not materially changed in the past two years, are as follows: (I shall quote from my paper read before the Philadelphia County Medical Society, March 11, 1925.)

The treatment should not be started until the woman is in active labor. The pains should be at least at five-minute intervals and lasting at least forty seconds. The length of the contractions are best judged by placing the hand on the abdomen and timing them with the watch, as the outcry of the woman is often a poor index of the

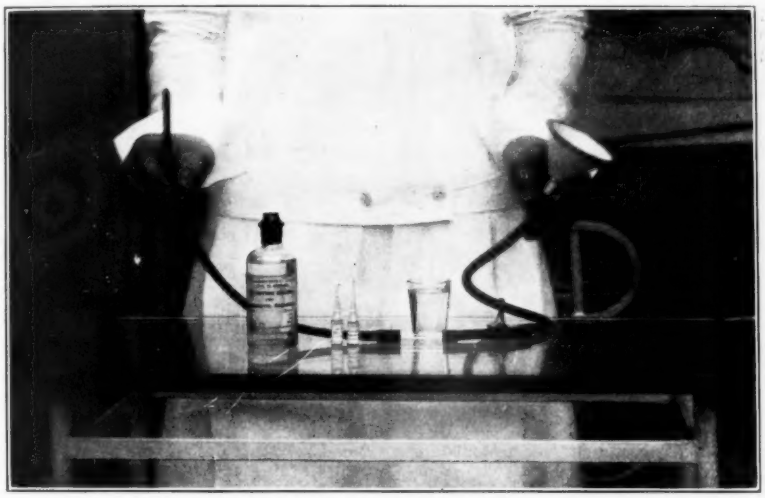

Fig. 1.—Materials for the Gwathmey procedure.

strength of the pain. Waiting for the labor to be well-established thus at once eliminates cases of so-called primary inertia from treatment. In a primipara it is best to wait until the cervix is fairly well effaced and dilated to a diameter of at least two finger tips; in a multipara it can be started before this degree of cervical dilatation is reached, if the pains are of the proper length and interval as described. At this time a cleansing soapsuds enema is given, and this is followed by the primary, intramuscular injection of 1/6 or 1/4 grain of morphine and 2 c.c. of 50 per cent solution of magnesium sulphate deep into the gluteal region. Judgment must be used as to the soapsuds enema, as it may not be required, if the customary soapsuds enema at the onset of labor has been recently given. The rectum must be both empty and quiescent to retain properly the instillation of ether in oil that is to follow the primary morphine and magnesium sulphate intramuscular injection. Experience has showed that 1/4 grain of morphine is usually the proper dose, but in a small woman 1/6 grain will be sufficient. Labor should be well under way as previously stated, so that the morphine will not stop the uterine contractions altogether. Tell the patient the object is to relieve her pain, but do not promise her a painless labor.

After this primary intramuscular injection of morphine and magnesium sulphate

the patient is to be kept quiet, oiled cotton is placed in the auditory canal, and the room is darkened. These attentions are reminiscent of the scopolamin amnesia suggestions, but they are of undoubted value in the proper induction of any seminarcosis. Twenty minutes after the primary morphine and magnesium sulphate injection we give a second intramuscular injection consisting of 2 c.c. of 50 per cent solution of magnesium sulphate alone. This is given no matter whether the effect of the primary injection is sedative or not, as it tends to prolong the action of the morphine.

We now come to the manner of giving and the time of the rectal instillation. It must not be used too soon. If the effect of the morphine and magnesium sulphate is sedative, withhold the instillation until the effect of the former is almost worn off.

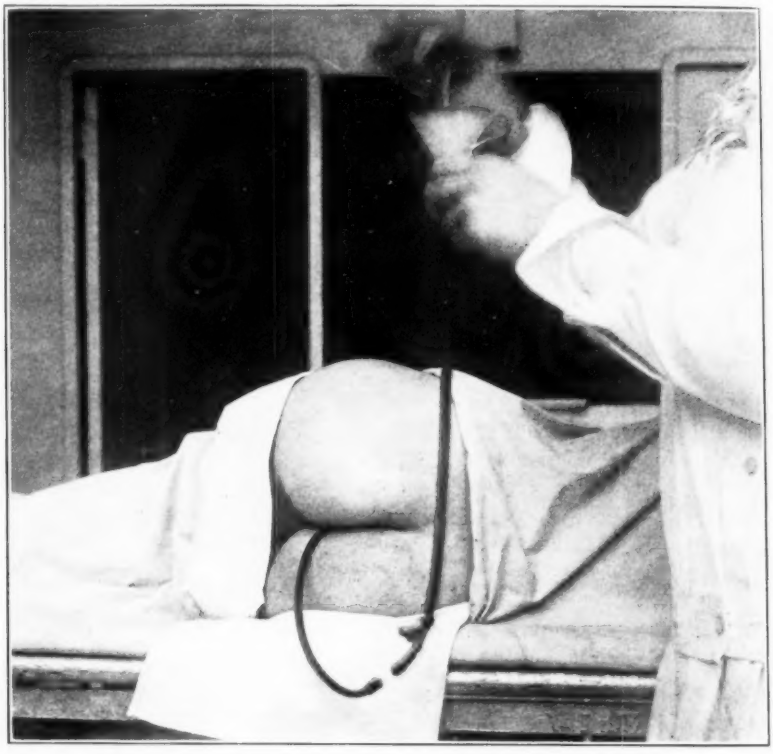

Fig. 2.—Method of instillation.

It is easier to give when the patient is still somewhat under the effect of the morphine; however, three to five minute intervals between uterine contractions should be present. For the beginner it is better to let the morphine and magnesium sulphate wear off entirely and to withhold the instillation until the patient is again complaining and the pains, at three to five minute intervals, are good and strong. If there is no relief from the morphine and magnesium sulphate within one-half hour after the second injection, which consisted of 2 c.c. of 50 per cent magnesium sulphate alone, proceed with the ether instillation. The ether instillation thus rarely should be given within an hour after the first injection of morphine and magnesium sulphate. It may be from one to three hours before it is needed, depending on the patient's distress. The ideal time in a primipara is at about three fingers tips' dilatation of the cervix.

The retention enema which can readily be prepared by any druggist, consists of

Quinine alkaloid	gr. xx
Alcohol	♏ xl
Ether	℥ iiss
Olive oil	q. s. ad. ℥ iv

It is given as follows: The contents of the bottle containing the ether mixture and the bottle containing two ounces of plain olive oil are warmed by letting them stand for a few minutes in warm water, first loosening or removing the corks. The patient is then placed on her left side and vaseline is liberally applied around the anus so that the ether mixture if expelled will not irritate. State to the patient, just before beginning the instillation, that its object is to relieve her pain, and thus secure her cooperation. Tell her that during the instillation she is not to press down during pains, but to breathe deeply with her mouth open, and at all times to "draw up" with her sphincter as if she were trying to avoid expelling gas. This will tend to induce reverse peristalsis and permit the fluid to run in more readily.

The apparatus consists of a four ounce funnel attached to a twenty inch length of rubber tubing, which is in turn connected by a glass connecting tip to a red rubber catheter, size 20 or 22 French. A rectal tube is too large.

Pour into the funnel one ounce of warm, plain olive oil. Just as the oil runs out of the catheter pinch the latter near the glass connecting tip with an artery clamp. In this way all the air will be expelled from the tubing. Some of the one ounce of oil should still remain in the funnel. The catheter is now introduced into the rectum for about four inches. If the fetal head is well down in the pelvis, the gloved finger must be inserted into the rectum along with the catheter to insure its passage past the head. A little of the warm ether mixture is added to the oil in the funnel, the clamp released and the contents of the funnel slowly permitted to run into the rectum. The remainder of the ether mixture is gradually added, at no time permitting the funnel to become entirely empty. Just as the last of the ether mixture is about to leave the funnel add the remaining ounce of the warm plain olive oil. Allow this to start running into the rectum and clamp the tube. It is important in order to avoid the expulsive desire that we prevent the entrance of any air bubbles into the rectum. Now make pressure on the anus with a towel during two or three contractions, leaving the pinched catheter in place meanwhile, then gently withdraw the catheter. Should a uterine contraction intervene during the instillation simply make pressure against the anus with a folded towel and let the funnel act as the escape reservoir. Continue to make pressure over the anus during three or four contractions after the catheter is removed. All these details are important and the successful retention of the instillation largely depends on the meticulous care with which it is given.

A third intramuscular injection of 2 c.c. of a 50 per cent solution of magnesium sulphate alone is then given immediately to prolong the action of the ether. The patient may now turn upon her back or assume whatever position is most agreeable to her. The same quiet is maintained as before. Do not make a vaginal or rectal examination too soon after the instillation or the instillation will be expelled. Do not be misled by the quiet behavior of the patient into thinking she is having very slight contractions or none at all. Within fifteen or twenty minutes you can smell ether on her breath, she becomes flushed, and occasionally has a little of the excitability of the first stage of ether anesthesia, but rarely to the extent of requiring restraint.

The patient is drowsy and sleeps lightly between the pains, but consciousness is not entirely lost. She responds somewhat tardily to questions and usually obeys commands as to change in posture. When a uterine contraction occurs she manifests her

suffering to a greater or lesser degree and again dozes. Occasionally the casual observer would have the impression that there was very little amelioration of the pain, the patient complaining and restless during the contractions, and yet afterward we find the amnesia secured to have been as definite as that after scopolamine. Frequently the patient confesses of her own volition that she remembered very little after the rectal instillation was given.

The obstetric side of the case and the progress of labor must be closely watched. Functional abnormalities must be discovered and corrected as they arise, and the mechanism of labor followed and managed as thoroughly as though no analgesia were being employed.

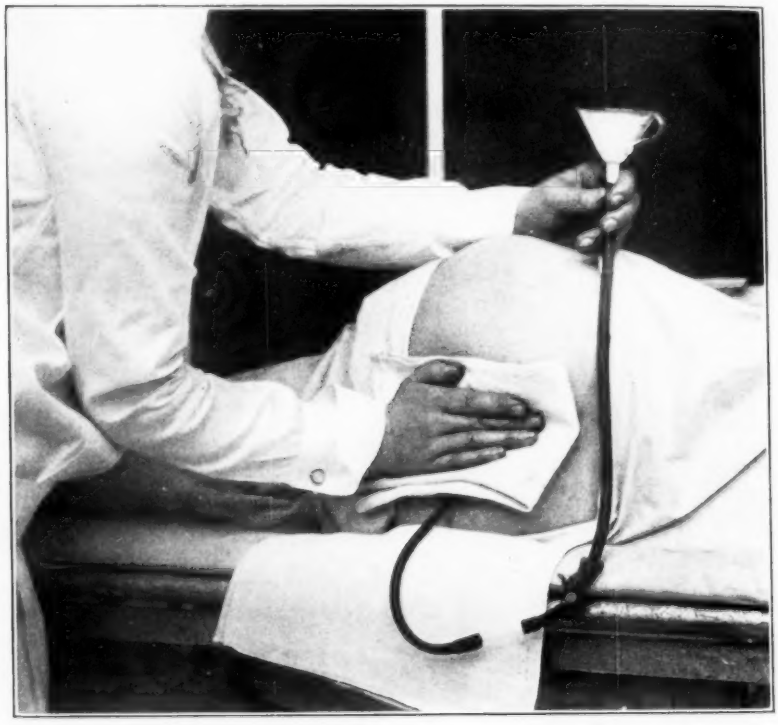

Fig. 3.—Towel pad held over anus after instillation.

When the effect of the first ether instillation has worn off; that is, when the patient again complains of pain, which is usually in from two to three hours, a second, or even a third, rectal instillation may be given at intervals of three hours or more. The first instillation given contains 20 grains of quinine alkaloid; in subsequent instillations only 10 grains are used. Each subsequent instillation is accompanied with one intramuscular injection of 2 c.c. of a 50 per cent magnesium sulphate solution. Contrary to some authorities we are convinced that the quinine is absorbed by the rectum, as evidenced by the occasional complaint of buzzing and ringing in the ears or slight deafness after the labor. We tried 30 cases, omitting the quinine entirely and found the omission of the quinine caused definite second stage and perineal delay. Dr. Losee, of the hospital laboratory, has now definitely proved the rectal absorption of quinine by its qualitative recovery from the urine in 92 out of 100 parturients.

A minimum of inhalation ether is needed for the delivery, and the anesthetist must be cautioned about this. Frequently no additional anesthesia is needed even for a perineorrhaphy. Chloroform should never be used with the ether rectal instillation. Gas, if desired, is safe and very satisfactory as an adjuvant anesthetic for the delivery.

Relief of pain in labor is always open to two serious objections: the prolonging of the labor and the endangering of the safety of the mother or her baby. We believe this method, of all procedures we have so far studied, to be the least likely to prolong the labor if not used too early, and in over 5,800 trials in the past three years to have been without danger to either mother or child. It can be used both in normal labors and in cases of dystocia, in labors induced with bags, in toxemias, in cardiacs, and in women in labor with acute pulmonary conditions to whom inhalation anesthesia might be disastrous. We find that it is applicable in hospital practice in 70 per cent of all labors. This is twice the applicability of scopolamine amnesia in our hospital experience twelve years ago. In other words, there is no obstetric contraindication to the treatment after active labor is initiated. It can be used in the home with equal facility and with equally good results, and does not require the services of a trained anesthetist, especially taking the place of gas anesthesia in the last three hours of labor. The out-patient staff at the hospital are using it with good effect in the tenement confinements. It perhaps does not carry the patient along as thoroughly or as continuously as morphine-scopolamine amnesia, but it gives more relief than any form of inhalation analgesia with which I have had experience. It is not dangerous to the baby, though if pushed to the degree of complete anesthesia, which is not the desired object of the treatment, the baby may be born rather deeply anesthetized. We find no increase in operative deliveries; in fact in some comparative series it seemed proved that the use of forceps was decreased. There has been no increase of postpartum hemorrhage and no increase in the stillbirth rate.

There are certain occasional annoyances—I cannot call them disadvantages—of the method to which I must refer. Most of them are due to faulty technic. The most evident of these is occasional expulsion of the rectal instillation. Close attention to all the details of giving the retention enema will obviate its loss in bulk. The frequent extrusion of small quantities of light yellow, sour smelling, liquid fecal matter, making it more difficult to keep the field clean in the perineal stage, will not occur if the cleansing soapsuds enema is completely expelled before giving the rectal instillation. In some cases nausea is present, but not as commonly as after inhalation etherization. Patients at times will complain of a slight burning sensation in the anal region immediately after the rectal instillation. The liberal use of vaseline will prevent this, though it sometimes may be due to an unrecognized

fissure. Now and then there is some distention of the colon with gas but not to any serious degree. Rarely the patient has diarrhea during the first twenty-four hours postpartum.

There is never any tender induration after the magnesium sulphate injections such as we see after mercurial injections. To date there have been five abscesses. Two of them occurred when we were using 6 c.c. in bulk of magnesium sulphate solution at one time, and two occurred after giving the injection in the thigh over the fascia lata, a location especially susceptible to abscess after any hypodermic. Considering the thousands of injections we have given, we are satisfied that, given intramuscularly with aseptic technic, the magnesium sulphate solution will not cause any abscess or necrosis per se.

If the primary injection of the morphine and magnesium sulphate is given too early it may temporarily stop the labor, but we have all seen morphine alone do the same thing when we have given it to ease the parturient's suffering while the cervix dilated. If this does occur, when the labor starts again the whole cycle of analgesia is repeated, waiting until the pains recur at at least five-minute intervals and lasting over forty seconds, and the cervix is at least two finger tips dilated before beginning again with the morphine and magnesium sulphate injection. Remember also to be very light with the inhalation ether at the perineal stage, as the patient goes under readily with a minimum amount and the baby may be born deeply anesthetized if much inhalation ether is given the analgesized mother.

Variations in the scheme will occur to physicians who use the rectal analgesia as their experience with it widens. With very large women, or when the ether instillation has no effect or even excites the patient and the birth is anticipated within two hours, a second instillation of one-half the original amount may be given at once. At times in nervous primiparae, or where for some reason we would like to start the analgesia before the pains and the cervical dilatation had attained the desired stage, $\frac{1}{8}$ grain of morphine can be given with the first 2 c.c. of magnesium sulphate solution, and in one-half hour a second $\frac{1}{8}$ grain of morphine with the second 2 c.c. of magnesium sulphate, then waiting for the strong pains and three finger tips dilation of the cervix before giving the ether instillation by rectum.

When one has occasion to perform a cesarean section under local anesthesia, an ideal preliminary procedure is to reverse the sequence, giving the rectal-ether instillation an hour before the operation and the hypodermic dose of morphine twenty minutes before. This will place the patient in perfect condition to receive the local novocaine injections, and the analgesia is greatly augmented. Recently we have followed this technic in several cesarean sections under local anesthesia and the absence of suffering on the part of the patient has been noteworthy.

In order to suitably classify our results in the histories we designate as an *A* case, one with perfect analgesia, i.e., where there was almost complete relief of pain and no additional inhalation anesthetic was needed for the delivery; as a *B* case, one where additional inhalation anesthetic was needed for the delivery; as a *C* case, where there was only slight relief of pain; and as a *D* case where there was no relief of pain. With this classification as a criterion the accompanying chart was made out. Fig. 4 lists 5,784 analgesized labors occurring in 1924, 1925, and the first six months of 1926. *A* and *B* cases were combined to produce a curve averaging 85 per cent, *C* cases averaged 10 per cent, and *D* cases averaged 4 per cent.

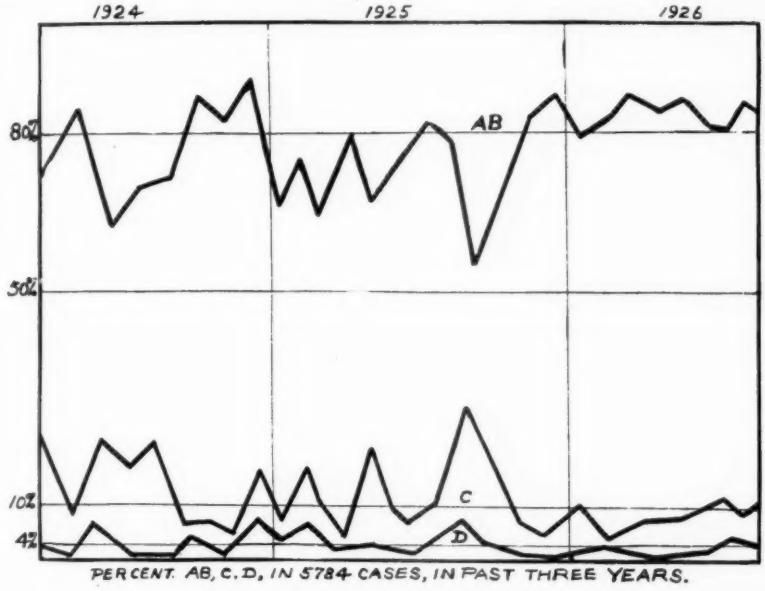

Fig. 4.—Showing classification of results.

SUMMARY

Pain is greatly relieved in 85 per cent of cases. In 5,800 analgesized labors we have observed no increase in asphyxia at birth or in the stillbirth rate. There is no prolongation of the perineal stage or increase in forceps delivery. The only contraindication to the procedure is uterine inertia and the only restriction is not to start too soon. The woman should be in active labor; that is, pains every four to five minutes, lasting forty seconds by the watch, and in a primipara, preferably the cervix should have attained a dilatation of two or more finger tips. The mechanism of labor must be as closely followed by the obstetrician as if no analgesia were being employed.

The drugs required—morphine, magnesium sulphate, ether, and quinine—are easily obtained and well known in their action. The

quinine is found to be an essential ingredient in the rectal instillation formula. The applicability of the method is much greater than that of scopolamine amnesia. It can be used safely and effectively by the physician in home confinements and does not require the services of a trained anesthetist. We are assured that this is the safest and most effective manner of relief of the pain of childbirth over a period of hours that has yet been devised, and are convinced that it will abolish the most dreadful part of the ordeal of labor without danger to either the mother or her baby.

100 East Sixty-sixth Street.

PRENATAL STUDY AND WHAT IT ACCOMPLISHES*

By Thurston Welton, M.D., F.A.C.S., Brooklyn, New York

THE successful culmination of an obstetric case depends in the main upon three factors:

1. Intelligent and faithful prenatal care.
2. Skillful and scientific management during labor.
3. Conscientious attention to postnatal hygiene and follow-up.

This chain is no stronger than its weakest link.

The greatest advance made in obstetrics during the past decade is that of antenatal supervision of the expectant mother. This supervision makes of obstetrics a branch of preventive medicine.

Prenatal care will prevent a large amount of ill-health and disability. It reduces maternal mortality and morbidity. It makes for a lowered fetal death rate. It aids in bringing healthy babies into the world. Surely, if this be true, one would imagine that every physician accepting the responsibility of a confinement case would feel it a part of his obstetric conscience to give that patient the full benefits of this first link in the chain of a properly conducted case. However, only a small percentage of the physicians put into practice prenatal care. For all that has been said and written on this subject, only a fraction of the profession really know anything about it.

Unless the physician at large gives proper consideration to this part of obstetrics, various agencies will go over his head and educate the lay public as to what to expect and demand of the physician who contracts to care for the pregnant woman. As an example of this method of educating the public, Dr. Herman Bundesen, Health Commissioner of Chicago, has written a brochure, with clever illustrations, entitled "*Before the Baby Comes.*" This booklet will be distributed far and

*Read at the Thirty-ninth Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, held in Chicago, Ill., September 20-22, 1926.

wide. Once a woman reads Dr. Bundesen's brochure she will know what to expect and demand of a physician regarding prenatal care.

What does prenatal care cover and in what manner is its application made effective? What is done for the expectant mother at the Long Island College Hospital in its prenatal clinic, can be followed by any physician anywhere. Outside of intricate laboratory tests, the instruments needed are easily procured and inexpensive. The physician should have a stethoscope, a pelvimeter, a reliable blood pressure apparatus, the usual things to make simple urine examinations, a knowledge of the fundamentals of obstetrics and an appreciation of deviations from the normal.

The objects of prenatal examination are as follows:

1. History.
2. General physical examination.
3. Measurement of the pelvis and a diagnosis of possible disproportion between the fetal head and the pelvis.
4. Urine examination.
5. Blood pressure readings.
6. Determination of presentation.
7. Examination for presence or absence of gonorrhea and syphilis, and if present the institution of proper treatment. A routine Wassermann is a good habit.

In the history, tuberculosis, cancer, hemophilia, and insanity in the family are looked into. Such diseases of childhood as rickets, scarlet fever, and diphtheria have a possible bearing on the condition of the pelvis, heart, or kidneys.

Operations, especially gynecologic procedures, are of interest.

A knowledge of venereal infection is most important. A thorough review of previous pregnancies—the number, length of gestation, outcome, type of labor, antenatal and postnatal complications, the incidence of infection, the condition of the baby at birth and the subsequent history—all must be studied in a thorough manner.

The patient is asked whether she suffers from headaches, visual abnormalities, pain, nausea, vomiting, vaginal spotting or bleeding, constipation, bladder disturbances, shortness of breath, etc.

The history completed, the patient undergoes a thorough physical examination. The examiner should be alert to discover foci of infection. The teeth, nose, and throat are common sites of pathology. In the neck enlarged glands and thyroid abnormalities are sought. The lungs, especially for the presence of tuberculous involvement, require careful examination. The detection of cardiac disease may prevent a loss in compensation and disaster. An examination of the abdomen, external genitalia, and the extremities, especially the legs for varicosities should be done.

For unknown reasons, the average physician does not attempt to measure the woman's pelvis. We wonder if it is because he thinks it is a complicated procedure calling for the higher specialized skill of the expert. It would be wasting paper and ink to review the measurements of the normal pelvis and consider pelvic abnormalities. We would advise those interested to review this chapter in DeLee's, Polak's, or Williams' textbook, and especially to fix in the mind the normal interspinous, intercristal, external conjugate, and the bisischial diameters. If the examining finger cannot feel the promintory of the sacrum or the posterior half of the brim, it may be concluded that the internal conjugate is normal.

The physician should keep a lookout for flat and contracted types. It is a good rule to remember that if a head will engage, it will come through, provided a funnel pelvis is not present.

If the bisischial and posterior-sagittal diameters at the outlet total at least 15 cm., we believe delivery is possible.

In an examination of the urine, he should look for sugar, albumin, acetone, urea, indican, pus, and casts. The total amount passed in twenty-four hours is measured.

In blood pressure readings, we consider a systolic of 130 mm., the upper limit of normal. Beyond this we become concerned and institute appropriate treatment.

The determination of presentation is reserved for the last four weeks of pregnancy. If a breech is discovered, attempts are made to maneuver it into a head presentation. Occipitoposterior positions are corrected by posture and binder. A diagnosis of face, brow, or transverse presentation calls for correction.

Beyond advice concerning the hygiene of pregnancy incorporating what exercise may be attempted, the dangers of horseback riding; swimming; the playing of golf and tennis; long automobile rides, etc., one cannot prevent the hemorrhages of pregnancy. However, prompt knowledge of early or impinging symptoms may often save life or long invalidism.

If gonorrhea is present, the signs are accentuated during pregnancy. Syphilis is detected by the history plus symptoms, and positive Wassermanns. If a positive diagnosis of syphilis is made, active treatment at once is the rule. We will show later what prompt treatment will accomplish. It is conceded that the antenatal treatment of syphilis is one of the triumphs of preventive obstetrics.

In the prenatal clinic of the Long Island College Hospital, each patient receives a pamphlet containing instructions as to the hygiene of pregnancy. In language she will understand, among other things, she is informed of the proper care of the mouth and teeth, diet, bathing, rest, clothing, exercise, sexual intercourse, and the care of the bowels. Many excellent books have been written by obstetri-

cians of ability for lay-reading. The physician may suggest that the patient procure one of them. Or, the well-known pamphlet, *Prenatal Care*, which may be obtained from the U. S. Department of Labor, Washington, D. C., (5 cents a copy) will serve splendidly. Many local maternity centers, and Departments of Health in cities and states all have available literature on this subject.

During the first five months, return visits are made monthly, some prefer these visits to be as often as every two weeks. We increase them to biweekly visits during the sixth and seventh months, and weekly during the last two months.

During these visits abnormalities are noted. The blood pressure is taken and the urine examined. In the last month of the pregnancy an abdominal examination is made to determine the presentation, size, and condition of the fetus.

During the first three months, we try to anticipate and prevent abortion and troublesome nausea and vomiting.

From the third to the seventh month, we find syphilis, toxemia, and cardiac disease are responsible for most of the interruptions of pregnancy.

As stated before, once the diagnosis of syphilis is established, active treatment is resorted to. This consists of weekly intravenous injections of arsphenamine and intramuscular injections of mercury for six weeks, followed by six weekly injections of mercury alone. If after this course of treatment the Wassermann reaction is still positive, the course of treatment is repeated.

In making a diagnosis of toxemia, we depend upon the urin-analysis findings, blood pressure, weight, and the symptoms of headache, vomiting, edema, and visual abnormalities.

When toxemia is suspected, the patient is seen daily until it is known from which type she is suffering, so that proper treatment may be outlined. We have yet to have any of our patients reach the stage of eclampsia. So rare has become the eclamptic fit that it is the occasional case brought to the hospital by the ambulance that has to serve the student as material for clinical observation and study.

Patients with cardiac disease are warned against exertion; and absolute rest in bed is urged one week out of every four. Proper heart tonics are prescribed. If well compensated, it is our habit to permit the pregnancy to go to term, irrespective of the lesion. During delivery we use morphine and scopolamine. If there is a break in compensation, the aim of treatment is to get sufficient recovery in order to terminate the pregnancy. This is best accomplished, if possible, by cesarean section under local anesthesia.

During the last trimester, we continue to be alert for early symptoms of toxemia and, in addition, we give attention to the prophy-

lactic care of the breasts, the relief of pressure symptoms, the prevention of premature labor, and the recognition of abnormal presentation and its causes.

Two moths prior to the expected confinement, the nipples after cleansing with soap and water, have liquid petrolatum applied to them daily.

Proper abdominal support and the correction of errors in dress will do much in relieving pressure symptoms.

The correction of abnormal presentation has been discussed in previous paragraphs.

We are used to statements that in the United States the maternal mortality is higher than in any other country for which statistics are shown; that, with the exception of tuberculosis, childbirth has the highest mortality among women in the United States, and that approximately 25,000 women give up their lives before, during, and after confinement every year. The problem is a complex and broad one—too involved for discussion at this time, but to be convinced that prenatal care will partly reduce the tragedy of childbirth, one has only to consider a few authentic reports.

In England and Wales (1922) among 2971 deaths from conditions associated with the pregnant state, toxemia caused 556. Concerning this Bourne said, "It is a fair estimate to state that, under efficient antenatal supervision and treatment, as many as four-fifths of the 556 deaths from toxemia might have been saved."

Dr. Campbell states in her report (referring to pregnancy toxemia) that: "The impression is gained from the fatal cases, especially investigated, that there was usually no antenatal care, often because the patient failed to seek advice for obvious symptoms."

In New Orleans (1923-24) the maternal death rate in the Parish of Orleans (no prenatal care) was 1.33 per cent, while in the Outdoor Department of the Touro Infirmary (prenatal care) it was 0.5 per cent.

In the causation of fetal death (survey by Holland and others, published by the Ministry of Health, Great Britain), under "Maternal States," out of a total of 113 fetuses, 42 died because of syphilis and six others because of probable syphilis, while five deaths were due to eclampsia.

Under complications of labor, out of 119 fetuses, 24 deaths were attributable to contracted pelvis; 16 to breech presentation; 10 to transverse presentation, and to brow and face, 4. It is obvious that many of these fetal deaths were unnecessary.

A. C. Beck (from whose reports many statements in this communication have been copied) in an article, *Syphilis in Pregnancy*, tabulated the end-results in a series of 144 syphilitic women cared for during a part of the whole of 166 pregnancies, treated in the Long Island

College Hospital. History and physical examination revealed luetic lesions in only 34 cases. Ninety-five of the 144 women had been pregnant before. Among these 95 women, 74 per cent of the pregnancies resulted in a dead, macerated fetus or a living syphilitic child. Thirty-three went into labor before salvarsan could be given. The result was 9 living syphilitic children, and 16 stillbirths, while 8 of these women gave birth to living children who showed no evidence of syphilis.

At least one course of antisyphilitic treatment was given to 76 women. Of these, 64 went to term and were delivered of apparently normal infants. Of the remaining 12, 6 gave birth to syphilitic children and 6 had stillbirths.

From 1 to 5 injections of salvarsan were given to 57 patients. Of these, 40 gave birth to apparently normal infants, 10 had stillbirths, while 7 were delivered of living syphilitic children.

Eighty-four per cent of the women who received 6 or more injections of salvarsan gave birth to living infants, who have shown no evidence of syphilis.

Occasionally syphilitic women carry all of their pregnancies to term and give birth to living infants. Careful observation shows most of these infants to be syphilitic. Syphilis, therefore, cannot be ruled out when a patient states that all of her children are living and well.

Harrar states that at the New York Lying-In Hospital during a period of six months, in 171 emergency labors, one in every 85 had eclampsia, while in 2,515 regular applicants in the same period, who had more or less prenatal care, only one woman in 420 had eclampsia.

Beck also tabulated 1,000 consecutive cases from the Long Island College Hospital. Of these 106 had contracted pelves. Complications of pregnancy sufficiently grave to influence end-results were observed in 77 cases. Of these, toxemia, syphilis, and cardiac disease were the most common. There were 40 abnormal presentations. Operative interference was required in only 60 cases. In 4,500 consecutive cases, similar to, and including the 1,000, 7 maternal deaths occurred, an incidence of 1 to 643 cases (0.15 per cent). There were 25 infant deaths or 2.5 per cent. These include 6 infants who died at less than fourteen days of age.

While in these 1,000 cases receiving prenatal care, 25 infants died, in 1,000 cases under prenatal nursing supervision there were 47 infant deaths. Contrast these with 1,000 cases with no prenatal care and 76 infant deaths. These figures are eloquent.

This has been offered in an attempt to prove to the physician at large that prenatal care is what Fairbairn terms, "The intelligent branch in the war against mortality and disability in childbed."

Purposely we have omitted many side issues of the subject, such as

maternity centers in cities, the organization of prenatal clinics, and the rôle of visiting nurses in this work.

The responsibility rests on the shoulders of the profession. Janet Campbell states, at the conclusion of her report, "Until antenatal supervision is accepted by patients and their advisers, the invariable duty of the professional attendant engaged for the confinement, we shall never make substantial progress toward the reduction of maternal death and injury. It is the key to success in any scheme of prevention and it must be insisted upon, until it is recognized as a necessary and integral part of the management of every confinement case."

J. O. Polak says that "the public should be taught what can be done by prenatal care and proper and clean obstetrics; for good obstetrics would go far toward removing the horrors of childbirth and the consequent dread of invalidism. Prenatal care is the right of every prospective mother. *Prenatal investigation permits us to discover syphilis, prevents the occurrence of eclampsia, allows the recognition of malpositions, and thus minimizes the difficulties of labor.*"

In obstetrics prenatal supervision is the first step, and, in this, conscientious *care* is the essence of the contract.

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842 UNION STREET.

THE CONDUCT OF LABOR AND THE MANAGEMENT OF OBSTETRIC EMERGENCIES*

An Analysis of 6562 Consecutive Cases of Labor Conservatively Managed

By Charles A. Gordon, M.D., F.A.C.S., Brooklyn, N. Y.

THOUGHTFUL study of the probems of maternal and fetal mortality is of tremendous interest and importance. The movement for reduction of infant mortality is steadily growing, yet withal, the baby is receiving more attention than its mother. She is told that frequent visits to her doctor will ensure her safe delivery. Nothing is further from the truth. The accidents and emergencies of labor are, of course, fraught with danger which no amount of prenatal care can do anything to diminish.

It is true that maternal health exerts a great influence over infant mortality, but we know that birth trauma too has a far-reaching effect. That 100,000 babies, not stillbirths, die every year, in this country, in their first month of life is not news. Reduction of these figures may depend as much upon the conduct of the labor as upon the character of the prenatal care.

In maternal mortality much is unavoidable, yet puerperal sepsis, and this is largely preventable, is the chief cause of the mortality. Deaths from other puerperal causes are more or less preventable too. Do not misunderstand me. Trauma, hemorrhage and infection we will always have, but it will take a long time to reach the irreducible minimum, the way we are going, for puerperal mortality has shown no appreciable decrease in many years.

We have long been told that childbed mortality in the United States is among the highest in the world. Many of us have disputed this, yet in considering the trend of maternal mortality in the United States, the Children's Bureau has recently studied deaths from puerperal causes, the accidents and infections of parturition, during a twenty-year period. It appears that deaths from all puerperal causes increased from 13.3 per 100,000 population in 1900 to 16.9 in 1921. However, after making all possible allowances for doubtful factors and errors, it is stated that the mortality from puerperal septicemia has actually decreased, while deaths from all other puerperal causes remain the same. The drop in sepsis is general throughout the world, which is very gratifying. Apparently progress is not being made with the other puerperal causes, accidents and emergencies of obstetric practice.

*Read at a meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, held in Chicago, September 20-22, 1926.

It is with this phase of the problem that we are particularly concerned, for responsibility must rest, in some part, upon the attendant at the labor.

If it is true that the mortality of eclampsia and cesarean section has been materially reduced, that vesicovaginal fistula has practically disappeared, that complete tears of the pelvic floor are seldom seen, and mutilating operations upon the fetus rarely done, it is equally true that failure of the average man to recognize disproportion, to watch for the complications of labor, and even to appreciate the extent of descent of the presenting part, is as common as it ever was.

Except for eclampsia, progress is being sought along surgical lines. There are those who say that obstetrics has become a surgical specialty. This is wrong, for the bulk of deliveries will always be done by the average man, who was taught a little in school and learned a lot himself.

Perhaps something is wrong with the teaching of midwifery. Possibly essentials are no longer stressed. Obstetricians are busy inventing operative procedures, looking to shorten or to eliminate the second stage of labor. One induces all women at term, another cuts the perineum of every primipara, while still another sections every eleventh woman and does version on the other nine or ten and, most remarkable of all, another calls all labor pathologic and advocates rapid delivery through a cut pelvic floor as soon as the head is through the cervix; this is followed by manual removal of the placenta. Pituitrin now improves upon the mechanism of the third stage of labor. Cesarean section has grown out of all bounds and is being done for almost every complication of delivery. For the breech, we are advised to do routine rapid extraction as soon as dilatation has become complete. One "views meddlesome midwifery with concern," and then recommends the use of bags to dilate his slow cases, while still another advocates digital dilatation of the cervix in the induction of labor, and so on.

In an effort to measure in some way the value of the work done in two Brooklyn hospitals, where the general principles of conservative obstetrics are still held, we have studied 6,562 consecutive cases of labor occurring in two institutions over a period of five and one-half years. Both hospitals maintain ambulances, but are organized with different types of staff. Hospital "A" has a closed staff. Hospital "B" has a closed staff with a very large courtesy staff. Here we have been as conservative as possible since we felt that our work might influence a large number of general practitioners who were bound merely by an established delivery room technic and the check of the staff conference, which has so functioned that consultation is usually asked in their major problems.

In both hospitals we have tried not to interfere with what seemed to

us would result in spontaneous delivery and have terminated only difficult or prolonged labor.

We are satisfied with rectal examinations, 90 per cent of all the cases having no vaginal examinations at all. Patients frankly progressing have no rectal examination. We are quick, however, to examine vaginally multiparae who fail to progress and primiparae when the head is engaged and no progress is being made.

We believe that primary posterior positions of the head are very common and teach our internes to suspect it always when the fetal dorsum is on the right. We treat these cases expectantly, looking for spontaneous rotation. Only after good dilatation do we do superrotation of the head or occasionally single blade forceps rotation.

Pituitrin is never used by internes and our only indication is inertia in an otherwise normal multipara, fully dilated, and membranes ruptured. By fully dilated we mean that the cervix is retracted over the head. Only small doses are used.

Morphine is freely used only in the first stage of labor with ether for operative procedures and delivery of the head.

Disinfection of the birth canal is not practiced, nor is the cervix routinely inspected for lacerations, nor is any coincident operation done. Lacerations of the perineum are repaired at once.

In our conduct of the third stage of labor, no time limit is placed upon the uterus, but immediately following delivery a tell-tale tape tie is placed loosely upon the cord at the vulva and the usual signs of separation of the placenta awaited. First simple expression, then Credè is tried; these failing, the patient is given more time and manual removal is done only for hemorrhage and for placenta previa when the placenta fails to separate promptly. Less than 7 per cent of all our cases had this operation, mostly in placenta previa.

In Hospital "A" there were 2,154 cases with 33 maternal deaths, or 1.5 per cent; 2,174 babies with 139 fetal deaths; of these 64 died after delivery and 75, including 25 prematures, were stillbirths. All were included, giving a total fetal mortality of 6.4 per cent.

In Hospital "B" there were 4,408 cases with 36 maternal deaths or 0.8 per cent, and 4,460 babies, of which 84 died after delivery, and 142 prematures, of which 76 died, and 233 stillbirths. All (393) were included, giving a rate of 8.8 per cent.

These figures have been analyzed from the standpoint of incidence of the commoner obstetric emergencies and operations in the two types of hospital, "A" and "B."

We have been slow to extend the indications for cesarean section, and no patient has been induced before term for disproportion. In this series there were 80 sections with four deaths, 23 in Hospital "A" with two deaths and 57 in Hospital "B" with two deaths, an incidence of 1.2 per cent with 5 per cent mortality. The deaths were due to

eclampsia in two cases, acute gastric dilatation in a case of mitral stenosis, and sepsis. Six low sections are included.

Weighing the risk of elective section against rupture of the uterine scar, with its disastrous consequences for both patients, we section again all those who have been sectioned before, at term if possible, or in labor, unless labor has progressed to a point where it may be quickly terminated by forceps or spontaneous delivery. Ten patients were sectioned for this reason.

Nine patients were sectioned for placenta previa. The others were managed by simple rupture of the membranes, or a Voorhees bag until dilatation was complete enough for version, which was then followed by spontaneous delivery or manual aid and delayed extraction.

Here the fetal mortality will always be high on account of prematurity. Only one-third of our patients were near term. We believe that until the maternal risk of section is reduced to that for other methods of delivery, section is not justified except in a small class of cases. So far we have done it only for the primipara in good condition with a poorly dilated cervix and a child near term. We are not ready, however, to expose a term baby to the dangers of placental separation and version, even in a multipara where there has been but little bleeding, if we feel that version will probably result in the baby's death.

In all we have had 99 cases, 29 in Hospital "A" with two deaths, an incidence of 1.3 per cent with mortality 6.9 per cent, and 70 cases at Hospital "B" with ten deaths, an incidence of 1.5 per cent with a mortality of 14.3 per cent. The total mortality was 12.4 per cent.

In eclampsia we feel that there is no doubt that delivery is a distinct advantage, yet only rarely can it be effected without increasing the risk. Although six patients in this series had cesarean section, we class abdominal delivery, except for an occasional preeclamptic at term, with all other forms of accouchement forcè, and believe that manual dilatation, difficult forceps and cervical incisions have no place in the treatment of this disease. As in placenta previa, the fetal mortality must necessarily be high under any method of treatment. All other cases have been treated with the utmost conservatism, morphine, chloral and protection from external stimuli and meddlesome investigation and treatment. We have abandoned sweating, colonic irrigations, spinal and intravenous medication and are about to drop venesection.

At Hospital "A" we saw 23 cases of eclampsia with eight deaths, an incidence of 1.1 per cent with a mortality of 34.8 per cent. In Hospital "B" there were 65 cases with ten deaths, an incidence of 1.5 per cent, with a mortality of 15.4 per cent. The total mortality was 20 per cent. All had convulsions.

Version was done 42 times in Hospital "A," 1.9 per cent and 110

times in Hospital "B," 25 per cent. Craniotomy nine times in both institutions, only on the dead fetus.

The use of forceps furnishes the most interesting figure for comparison between the two types of work. Hospital "A" had 76 forceps deliveries, an incidence of 3.5 per cent, Hospital "B" had 511 forceps deliveries or 11.6 per cent.

Perineotomy was done ten times in Hospital "A," and 106 times in Hospital "B," all on primiparae.

Summarizing briefly, it is not my intention to draw any conclusions or to suggest any comparisons. The series is small. There is nothing to be gained. These figures are merely shown as representing the work of a large number of men practicing obstetrics in a hospital where there is a department of obstetrics and a courtesy staff, as compared with the work of another hospital where all the obstetrics is managed by the staff itself. They vary but little except for the incidence of forceps and a rise in fetal mortality which is in part accounted for by a large number of stillbirths which need further analysis.

I believe there is a rapidly widening gap between the specialist, on the one hand, daily improving his skill, conducting clinical research, publishing much, and the average man, who, when all is said and done, handles the bulk of obstetrics.

The average man has always meant well. His heart is right. Often he tries hard; he reads his journals and listens to papers, which all too often deal with major phases of obstetrics with which he is but little concerned. He needs fundamentals, as does the undergraduate student.

Hospitals might well open their doors for the practice of obstetrics to all those near them who will agree to follow the rules for technic, consultations, and operative deliveries and report their difficulties and casualties at the staff conference. Do not underestimate the value of that. The staff conference is the greatest single factor in the organization of the hospital for the protection of the patient and the education of the staff.

There is a problem. Apparently there is a crying need for improvement. We must take cognizance of it. The responsibility is ours. Just as the medical school accepts responsibility for the training of men to practice medicine, so is the medical profession itself bound to see that those within its ranks are qualified.

National societies like this, local special societies, and organized medicine in the state and county medical societies must take up the burden. Only then will we make progress. The answer will be found, not in the training of more specialists, we never could train enough, but in the continuous education of the average man. That means graduate education, not by providing courses for those who

seek them, but by the organization of hospitals everywhere, making available for all the vast amount of clinical material which passes through their wards, and carrying to all, clinical opportunites for review of their own experiences, which are now denied them. Hospitals will then arrive at their full measure of usefulness, and the medical profession discharge its obligations to the public and each other. Let us do it.

256 JEFFERSON AVENUE.

VAGINAL HYSTERECTOMY AND ITS INDICATIONS*

BY J. W. KENNEDY, M.D., PHILADELPHIA, PA.

I WOULD be very happy indeed if I could present this subject to our association as it was taught me by probably its greatest advocate and master, the late Joseph Price, who was one of the founders of this association and a former president.

I take it for granted that we are just as remiss in not well practicing what we know by making use of our medical and surgical privileges, as we would be to grow indifferent and lacking in the habits of industry in the pursuit of scientific innovations of the future.

Disparity between privileged results of surgery of the acute abdominal conditions, surgery of the uterus and of the breast, and our everyday results, is so significant that we cry out for better control of these lesions.

Reviewing our results for the past twenty years in the Joseph Price Hospital, we are able to say with as accurate statement as it is possible to make with such review, contrasting our privileged results with those existing, that we are utilizing only about 5 per cent of our surgical privileges in the major urgent conditions. In other words, 95 per cent of our fatalities were due to human errors, possibly such had better be called personal or individual errors, as they are not the shortcomings of scientific attainments.

In spite of such organizations as the great American Medical Association, the American Congress of Surgeons, and associations such as ours which have even transcended in accomplishments the most sanguine expectations, yet we remain a crippled profession as far as our execution goes, even though our scientific privileges are magnificent. We are not in possession of the people. We have not been able to educate them as to our real worth of service. However, I feel that the more recent organization of the Gorgas Memorial Institute of tropical and preventive medicine by Dr. Franklin Martin, is a very

*Read at the Thirty-ninth Annual Meeting of the American Association of Obstetricians, Gynecologists, and Abdominal Surgeons, held in Chicago, Ill., September 20, 1926.

strong bridge over which we may carry the knowledge of the privileges of our advanced thought and work. Occasion and space do not permit me to go into the workings of this great Gorgas movement, so I can only add that this organization by taking in lay members and through talks by its medical members to lay associations, and further, by the publication of short articles understandable by the masses, such articles being published in the lay press, we have the most forceful method, in my belief, of bringing before our people the great life-saving service of which our profession is capable.

I have given this preliminary discussion because I know of no subject or condition where privileged results are so outraged as those of the offending uterus.

I am forced to speak of vaginal hysterectomy as the method for removing the uterus, as I find that over 90 per cent of the uteri which have been removed during my association with the Joseph Price Hospital, have been extirpated as a vaginal hysterectomy.

In spite of this large percentage of vaginal hysterectomies as compared with the suprapubic route, were it not for the clamps, I would not do vaginal hysterectomy.

ADVANTAGES OF THE CLAMP METHOD

The clamps have increased the operability of the procedure by at least 50 per cent. The clamp is the very best method of controlling hemorrhage. The operation may be done very much more quickly with the clamps, as remote vessels may be easily secured.

The ties being very insecure by the ligature method, I believe, is one of the reasons the operation has never become popular.

In removing the uterus when in procidentia, the clamps have a most important function, as their rigidity holds the vaginal fornix at a high level and does much to correct the cystocele and rectocele. The clamps have a very important function from the standpoint of drainage.

MORTALITY OF VAGINAL HYSTERECTOMY

In comparing the mortality of vaginal hysterectomy with the suprapubic method of removing the uterus in the Price Hospital, we are compelled to endorse the lower route of removing the uterus. Although there have been no deaths from the suprapubic method from either operative or postoperative hemorrhage or from operative infection, during the period that the suprapubic and the vaginal operations were compared, yet the mortality was fifteen to one in favor of the vaginal route.

INDICATIONS

The indications are fibroid tumors which may be delivered by the vaginal route, practically all malignant conditions of the uterus other than the possible malignant degeneration of the large fibroid tumor,

procidentias of the uterus and marked prolapse of the heavy organ where pregnancy is not to be considered, the offending uterus of the large fleshy woman, a condition of the cervix which I choose to call the abused cervix, and the bleeding uterus which has resisted conservative treatment.

FIBROID TUMORS

A comparison of the mortality between the suprapubic method and the vaginal route of removing the fibroid uterus has conspicuously shown the real tragedies of suprapubic hysterectomy.

On account of the sudden deaths which follow several weeks after a perfect convalescence from a suprapubic removal of a fibroid tumor, I have felt for a number of years that the fibroid tumor which has existed for a good length of time evidently produces a toxemia which causes a tissue degeneration. We know the abdominal walls of a fibroid patient grow thick—such tissue is most probably a form of degeneration—and a like condition is evidently taking place in the myocardium and thus accounts for some of the sudden deaths.

For a number of years we thought these sudden deaths were due to embolus or thrombus, but in more recent years I feel many of these sudden deaths following removal of the fibroid tumor of the uterus are due to a diseased myocardium. I have never seen such sudden death follow vaginal hysterectomy.

As the operative time of vaginal hysterectomy is about one-tenth that of the suprapubic method, operative shock is practically never seen. I have seen but one instance in several thousand operations. I have never seen postoperative pneumonia follow the vaginal operation. As vaginal hysterectomy is practically an outside procedure, all of the units of operative depression and trauma are reduced to the minimum.

If one cares to resort to morcellation, there is scarcely a limit to the size of a fibroid tumor which may be removed from below.

MALIGNANCY OF THE UTERUS

Other than the malignant degeneration of the large fibroid tumor of the uterus, all malignant conditions of the uterus are met by vaginal hysterectomy.

It must be remembered that probably 90 per cent of uterine malignancy occurs in the cervix, so that the big end of the malignant cone is at the cervical location and most accessible to vaginal work.

The clamp method of vaginal hysterectomy not only greatly enlarges the percentage of operability but also much increases the amount of tissue which may be removed.

Much of the vaginal fornix may be removed with ease by the clamp method, which would be quite impossible by the ligature method of operation.

It must be kept in mind that all the tissue which is within the clasp of the clamp sloughs away, so that the operation is more extensive in tissue removed than would appear.

Many malignant cases much too late for ligature operation from below are still easily managed by the clamp method. We are constantly operating upon patients for malignancy of the uterus from six months to a year after they have been refused by good operators who do not use the clamp method for hysterectomy. We much regret the fact that these patients are too often turned over to the x-ray operator when they are still good risks for a permanent cure by the vaginal hysterectomy clamp method.

Before we begin to do the vaginal hysterectomy, we most thoroughly cauterize the cervix, which not only prevents malignant operative implantation but also cleans up the field of operation.

It is my opinion that the vaginal hysterectomy clamp method is our solution at this hour for malignancy of the uterus; the only missing link is early diagnosis.

We must teach the student not to dismiss the possibilities of malignancy of the uterus simply because the cervix seems uninvolved. He must be taught the three zones of uterine malignancy, namely, the cervix, the fundus, and the middle portion of the organ near the location of the internal os. The student should also be made familiar with the relative dangers of such locations of malignancy and also the relative frequency of each, etc.

PROCIDENTIA

Procidentias are clear cut indications for vaginal hysterectomy and yet several recent graduates from our big universities have informed me that they had not seen a vaginal hysterectomy.

The clamp method for removing the uterus in procidentia has a most important function in correcting much of the rectocele and cystocele. I know of no more miserable condition than the patient with a completely prolapsed uterus with big, painful ulcerating areas. Many of these patients are told nothing can be done, whereas, removal of the organ by the clamp method, which may be followed by repair of the cystocele and rectocele, has given the most brilliant results of my experience.

THE ABUSED CERVIX

We are often confronted with a pathologic condition of the cervix which I choose to call the abused cervix. The cervix is very large, even larger than the fundus of the uterus; it has been badly lacerated; its lips are everted and hypertrophied and covered by large eroded areas of granulating tissue. The entire surface may be studded with nabothian cysts, very tender to the touch and adding materially to the size

of the organ, and there may be beginning malignancy. So the cervix has been abused from the standpoint of laceration or injury, and abused from the standpoint of pathologic growth.

Many of these patients with such a cervix are nervous wrecks and fit subjects for the asylum. I have seen such a patient pass into a paroxysm from the mere touch of the cervix. Certainly vaginal hysterectomy is here indicated, as the organ is beyond repair or salvation.

THE BLEEDING UTERUS

We occasionally see a small uterus with no evidence of tumor, which has resisted all conservative means of treatment. Such organ may have to be removed. We often refer to such condition as a fibrosis of the uterus, although there is in reality no fibroid tumor—indeed the organ is often small. Such conditions can best be met by a vaginal hysterectomy.

I have felt for a number of years that in the case of a patient forty years of age or older, the uterus with a polypus protruding from the cervix should be removed, for the reason that very often the fundus of such an organ may contain one or more polypi and malignancy may always be lurking near.

HYSTERECTOMY IN THE FLESHY WOMAN

For the patient forty-five years old or older, who weighs from 180 to 250 pounds (and there are many of them), who is carrying an offending uterus, I feel vaginal hysterectomy is by all odds indicated. These cases are poor subjects for any kind of surgery, their hearts are participating in the fatty degeneration, and their deaths are often the acute tragedies seen by all of us.

Their size does not interfere with the vaginal route; the quick operation and the absence of all elements which contribute to shock and postoperative pneumonia are overwhelmingly in favor of the vaginal hysterectomy clamp method.

Vaginal hysterectomy has been considered a difficult operation. I am sure any operator with ordinary ability can master every detail of the procedure if he will adopt the clamp method of doing the operation and observe one or two technical points in the hysterectomy.

The method used in the Joseph Price Hospital differs from popular teaching in a number of essential features which I believe have made the procedure much more simple, safe, and manageable. Space does not permit me to go into the technical operative steps; such has been illustrated in full in a monograph entitled, *Practical Surgery of the Joseph Price Hospital.*

I have not gone into the relative merits of thoroughness of the vaginal

hysterectomy clamp method as compared with the very radical suprapubic method as advocated by Wertheim.

Some years ago I made a study of the radical suprapubic method of removing the uterus, and I found in examining the specimen removed, after the operation, that my most radical attempt in removal of the uterus and the periuterine structures had often consisted in more of a dissection than the real extent of tissue removed; and further, that a great amount of tissue which I supposed had been removed, remained in the pelvis in the periuterine area.

With the exception of removal of the abdominal glands, I believe that the vaginal hysterectomy clamp method is as radical an operative procedure from the standpoint of potential malignant tissues removed, as it is possible to do.

If we compare the number of patients who die from extension of uterine malignancy through continuity of structure, with those who are lost from involvement of the abdominal glands, much light is thrown on the subject.

Most operators have found the primary mortality of the Wertheim procedure prohibitive, etc.

I will conclude by saying that vaginal hysterectomy has the broadest field of usefulness, the lowest operative mortality, and the best postoperative history of any major operation to my knowledge.

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THE TRANSVERSE EXCISION OF THE FUNDUS UTERI WITH OVARIAN CONSERVATION*

By Prof. Oscar Beuttner, M.D., Geneva, Switzerland
(Honorary Fellow)

In 1908, I published my method of transverse cuneiform excision of the fundus uteri with conservation of healthy ovarian tissues and the extirpation of both chronically diseased tubes. This publication which appeared in the *Centralblatt fuer Gynaecologie* was followed in 1909 by one in the French language and in 1910 by a third in the English language, in *The Journal of Obstetrics and Gynecology of the British Empire*, September, 1910.

In August, 1913, I read a paper on the occasion of the Seventeenth International Congress of Medicine, in London, on the transverse cuneiform excision of the fundus uteri as the first stage in the extirpation of bilateral chronically diseased appendages, with conservation of the menstrual functions. I then described my method as follows:

After opening the abdomen, the appendages of the uterus have to be closely examined, paying special attention as to whether comparatively healthy ovarian tissues are obtainable; if this is the case, and the patient is comparatively young the transverse fundamental incision of the uterus is proceeded with. That is to say, first of all, the two edges of the uterus are stitched round, as deep down as possible, with strong catgut to reduce the hemorrhage.

Next, the anterior and posterior walls of the uterus are caught in the middle line, two inches below the fundus, with a fine forceps and the uterus is raised. Then follows a transverse incision, first in the front and then in the back of the uterus, forming a cuneiform mass of the fundus. This cut must be modified according to whether it be desirable or possible to spare in front the insertion of the round ligaments and in the back the insertion of the ligaments of the ovaries. The cuneiform cut must not be split in the middle line and both halves are freed up to the broad ligaments. The wound, which must reach as far as the cavity of the uterus, must be immediately closed.

Then the diseased appendages have to be set free from the inner to the outer side, and from below upwards; in so doing it is absolutely essential to preserve some of the comparatively healthy ovarian tissues.

In some cases the two ovaries may be entirely spared, at other times they must be partially cut away; again in other cases one of the ovaries must be excised and the other can be partially conserved. Closing both wounds in the broad ligaments, the anterior parietal peritoneum is fixed on the posterior and upper wall of the uterus with catgut, near the seromuscular seam, continuously from right to left, in order to further solidify the termination of the wound which has been made in the uterine fundus. This seam holds up the uterus in mobile anteflexion.

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*Read at the Thirty-ninth Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, held in Chicago, Ill., September 20-22, 1926.

Up to the present date I have performed eighty such operations, the ultimate results as regards pain and anomalies of menstruation, being excellent.

Dr. Schmid, of the Prague Clinic, has published 120 cases treated by my operation and Professor Wagner, of the same clinic, has recently very strongly recommended the transverse cuneiform excision. The latter concludes his article in the *Biologie und Pathologie des Weibes* (published by Halban and Seitz), with a reference to this excision, which is not sufficiently appreciated by German gynecologists.

In the same work Professor Heynemann, of Hamburg, also refers to my operation. He considers it an enrichment of our operative methods and proposes to use it in the cases in which it is indicated.

Dr. Mansfeld, of Budapest, has informed me that he has performed several such operations, and has lost only one patient. The cases will shortly be published in detail. Professor Licane, of Paris, who has published twenty-one cases and has called my method "hysterectomie fundigue," considers that this simple method of conservative hysterectomy, which in 76 per cent of all cases allows of the hope of conserving the menstrual functions, deserves wider knowledge and use among surgeons.

Professor Bell, of Liverpool, who calls my operation the "Bell-Beuttner" operation, made his first application of the conservative principle in 1913; and in *Surgery, Gynecology, and Obstetrics* for January of this year he presents a record of 127 cases with only 2.3 per cent mortality. He says: "Although in the United States the operation has been called the Bell-Beuttner operation, it should be understood that in this designation the similarity of principle rather than that of technical detail is implied. Moreover, although I was unaware of the fact, and devised the operation quite independently, there is no doubt that Professor Beuttner's past communication preceded mine."

There is no doubt that my American colleagues are well aware of the true position of the question, for I have read with much pleasure the following passage by Gellhorn in the *Transactions of the American Association of Obstetricians, Gynecologists, and Abdominal Surgeons,* 1921, xxxiv, 158:

"To reduce this dreary train of operations (the persistence of the inflammation in the interstitial positions of the tubes) Beuttner, of Switzerland, devised an operation which was sponsored by Polak in this country and revived by Bell in England, and consisted of the removal of both adnexa and a part of the uterus."

Finally, it should be noted that of course every surgeon operating on my principle has developed his own technic.

My recommendation always to perform a hemisection of the cuneiform cut of the fundus uteri has not been accepted. But as hitherto

I have used my method only in very serious cases, I have considered that the hemisection would greatly facilitate the operation. I have further come to the opinion, previously also held by Schmid, that in less serious cases bilateral salpingectomy could be abandoned in favor of transverse cuneiform excision of the fundus uteri. Of course in such cases the hemisection is not necessary and the appendages of the uterus can be extirpated from left to right or conversely, according to the American method of Kelly.

THE BIOLOGIC DEFENSE IN PUERPERAL INFECTION*

By Palmer Findley, M.D., F.R.C.S., Omaha, Nebraska

AN UNTOLD amount of work has been done on the biologic problems related to puerperal infection, but as yet we know little of the susceptibility to infection and the powers of resistance. When we speak of body resistance and of tissue reaction to infection we speak in generalities and with little knowledge of the factors concerned. The clinician observes two cases in which the bacteriologic conditions are apparently identical, yet one escapes with a mild degree of infection, the other dies. Again he observes a grave case of sepsis in which there were no evident predisposing causes to account for the infection. All this suggests our limitations in determining the mechanism of defense in any given case. It is one thing to identify the microorganisms, to recognize the atria of infection, to account for predisposing factors, and to note the avenues by which the infection spreads through the tissues of the body; but it is quite another thing to judge of the forces of defense, much less to reinforce the defense in any definite scientific manner.

In this connection the London Report on *Puerperal Sepsis* is significant. In this report was an analysis of 247 cases of which 160 recovered and 87 died. In the first group of 160 cases 26 per cent were delivered spontaneously and without laceration or venereal discharge. The source of infection could not be revealed. The remaining 74 per cent of cases were delivered by forceps or version and lacerations resulted. In the second group of 87 cases which resulted fatally labor was spontaneous and without lacerations or known causal factors in 22 per cent, while in 78 per cent labor was prolonged, requiring forceps or version and with injuries to the soft parts. It will be observed that the percentages do not differ materially in these two groups. It is apparent that some unknown factor

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or group of factors was responsible for the results recorded; and we ask why recovery in the first group and death in the second group? The answer probably lies in the difference in the defensive mechanism.

A consideration of the forces at work in combating infection involves the whole subject of immunity, a task I would not presume to engage. The recent work of J. Hofbauer, of Johns Hopkins, on the cellular defense in the parametrium is of very great significance and well worthy of further investigation. Metchnikoff laid the foundation for all that is known of cellular defense in infection. Applying his observations on phagocytosis to the infected uterus we have long known of a cellular defense in the decidua; a so-called granulation zone composed of leucocytes. Here the polynuclear leucocytes greatly outnumber the mononuclear cells in the acute stage of the infection, the mononuclear leucocytes coming more in evidence in the later stages of the infection. Metchnikoff early pointed out that the polynuclear cells ingested living bacteria while the mononuclear cells ingest cell detritus and to a more limited degree the bacteria. It is further observed that the mononuclear cells seem to arise from fixed tissues of mesoblastic origin. It would appear that they serve the purpose of removing cellular exudates of long standing as contrasted with the polynuclear cells which are largely engaged in the destruction of bacteria in the early stages of infection. In event of failure of the leucocytic barrier to withhold the attacking microorganisms, the myometrium becomes increasingly beset with leucocytes as the bacteria invade the wall of the uterus.

All this has long been known but it remained for Hofbauer to demonstrate specific types of cells in the cervix, in the lower uterine segment, and more particularly in the parametrium at the base of the broad ligaments. That leucocytes are not the only phagocytes in the body is conceded by all immunologists. Kolmer says that, "besides leucocytes, some of the tissue cells which are free, or have the power of becoming so, are actively phagocytic." He furthermore says that endothelial cells of the lymph spaces and serous cavities are especially active, not only in the phagocytosis of other cells and cellular débris but also of various bacteria; that in exceptional instances epithelial cells may act in the capacity of phagocytes. Wells adds that "there is also evidence that the fixed tissue cells of the reticuloendothelial system, which are universally distributed, are especially active in the production of antibodies," and that "not only leucocytes but tissue cells are capable of phagocytosis when properly stimulated, and apparently all or nearly all fixed cells may act as phagocytes under some conditions. Reticuloendothelial cells are particularly active in phagocytosis as also are the new mesodermal cells produced by inflammation. Apparently they obey the same laws as leucocytes and not only

take up bacteria but also fragments of cells and tissues, red blood corpuscles and even intact leucocytes and other tissues."

This extended recognition of the phagocytic power of cell types brings us to a ready understanding of the work of Hofbauer. In addition to the phagocytic leucocytes which abound in the parametrium in the presence of invading microorganisms Hofbauer has demonstrated the presence of specific cell types which he classifies as monocytes and clasmatocytes. These he has found in limited numbers as early as the third month of normal pregnancy and has observed their increase in number as pregnancy advances. In event of prolonged labor and of infection following labor the increase in the cell elements was very great.

In the nonpregnant woman the parametrium is made up of dense fibrillar connective tissue, a few muscle bundles and a very limited number of cell elements. In event of pregnancy the cell elements increase rapidly in numbers and arrange themselves along the course of the lymphatics which accompany the blood vessels. These cells are believed to originate from small oval cells grouped about small blood vessels and are probably identical to the adventitial cells of Marchand. The transition from the small oval cells in the neighborhood of small blood vessels to monocytes and clasmatocytes can be clearly traced. The monocytes are fairly uniform in size, kidney-shaped or rounded in outline with ragged margins; the nucleus is round and large in comparison with the cytoplasm. The clasmatocytes are larger than the monocytes and are found in greater numbers. Their oval nucleus occupies an eccentric position. These cells vary greatly in size and form. The cytoplasm exceeds that of the monocytes and within the cytoplasm are vacuoles and in the vacuoles and cytoplasm may be seen blood pigment and cell débris. Both monocytes and clasmatocytes take the neutral red stains. It is therefore clearly demonstrated that these cells (monocytes and clasmatocytes) are phagocytes. In advanced pregnancy and particularly in event of infection the parametrium abounds in them.

In addition to the above cell types Hofbauer describes lymphoid bodies beneath the endothelium of the lymph spaces of the parametrium. These he regards as primitive lymph nodes and credits them with phagocytic qualities. That these cell structures play an important rôle in combating infection is demonstrated by the experiments of Portis, who found that the clasmatocytes of the omentum showed increased activity after intraperitoneal injections of antigen; while Gay and Morrison observed that animals in which exudates were made rich in polynuclear leucocytes by the injection of such substances as aleuronat were no more resistant than normal animals, but where there was present an abundance of histiocytes in the exudate the animal could withstand many multiples of the fatal dose of

streptococci. The observations of Gay and Morrison led them to conclude that histiocytes are in great measure, if not entirely, responsible for the local defense against streptococcic infection. Nakahara injected the peritoneal cavity of mice with olive oil and found that the resistance to infection other than streptococci is increased by provoking a macrophage reaction.

It has been demonstrated experimentally that resistance to bacterial infection is coincident with marked reaction of macrophages. Metchnikoff demonstrated the important fact that phagocytosis is uniformly more active where the infected animal recovers. In animals which show a natural resistance against any given microorganism, phagocytosis is correspondingly more energetic than in animals which show a susceptibility to the same infective organism.

I am not concerned with the controversy between the humeral and the cellular theories of defense because, in the words of Karsner and Ecker, "The two theories of immunity are in perfect harmony with one another and it is known that they are dependently interrelated."

If we are to accept the hypothesis that these phagocytic cells are potent factors in defense of infection, the question arises as to the nature of the stimulant giving rise to them. Are foreign proteins the cause? Hofbauer doubts this because the maximum activity of chorionic deportation through the blood stream is in the early months of pregnancy, whereas the cellular reaction in the parametrium is at its height at the end of pregnancy. He believes it to be conceivable, however, that "the hormones or whatever substance which produces the well-known changes in various organs of the pregnant woman causes the parametrial phenomena." The invasion by bacteria of the parametrium unquestionably supplies the impetus for the added increase which is seen to such a marked degree in event of infection.

In a personal communication Hofbauer writes that he is now experimenting with chemicals in the effort to find an artificial means of stimulating the parametrial tissue in the hope of augmenting the development of phagocytes. And we ask, is it not possible that such antiseptics as mercurochrome and silver nitrate combat infection not alone by their direct destruction of bacteria, but by stimulating the development of phagocytes?

428 Aquila Court.

A CONTRIBUTION TO THE PHYSICAL THERAPY OF UTERINE AFFECTIONS*

By Joseph Riviere, Sc.D., M.D., Paris, France

THE recognized harmlessness of well-managed physical therapy joined to the usual efficaciousness of its processes, has assured the progressive development of the method for the treatment of certain gynecologic affections. The most beneficent results are obtained chiefly by high-frequency, diathermy, actinotherapy, intrauterine ionization, and roentgenization. It is often of advantage to associate these various procedures in order to obtain the best results: the regularity of regional circulation, the regeneration of the smooth fibers, the resolution of the edemas, congestions and indurations, antisepsis against uterine infection, equilibration of the involution of the matrix, and reconstitution of the pelvic parenchyma.

Physiotherapy may reestablish the vitality of the organs which precedes those conditions of chronic inflammation and sclerosis.

Two syndromes often complicate the gynecologic case,—neurasthenia and gastrointestinal atony. The static bath, high-frequency effluve, and the ultra-violet rays in the former; diathermy and actinotherapy in the latter, will improve these nervous disorders, but especially when the liver is activated by means of such a drug as calomel, which I prefer, and the other emunctory organs are constantly functioning. It is thus that we generally bring about an improvement in neuropathic subjects with pelvic pains; the irritation of the uterus diminishes as well as ovarian hyperesthesia and the lumboabdominal neuralgia.

Physical therapy should not limit its curative effects to the local conditions. What it ought chiefly to aim at is the modification of the dyscrasic predisposition. Since my inaugural thesis (*Nervisme-Neurarchie*), Paris (1884), I have always considered that the physical agent affects the centripetal peripheric nerves, whose excitation is conveyed to the neurons of the diseased region. Such is the genesis of action of physical therapy.

Dysmenorrhea, whether spasmodic, congestive, inflammatory, or even membranous, is often amenable to physical therapy. The static bath and general d'arsonvalization, combined with localized galvano-

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faradization, ameliorate the most rebellious menstrual pains. I have found that this treatment overcomes amenorrhea. At the Congress of St. Petersburg, 1901, I stated that the application of the ultraviolet rays to the abdomen regulates the catamenial flow and lessens ovarian neuralgia.

For more than a quarter of a century, I have used daily the intrauterine ionization treatment and the three forms of high-frequency (effluvation, scintillation and diathermy) for cervical and endocervical metritis. Short and repeated applications, without pain and in exact dosage, are preferable in my experience to chemical caustics.

In the treatment of vegetative or catarrhal ovaritis and salpingitis, hydro- and pyosalpinx of blennorrhagic or tuberculous origin, not calling for immediate surgery, we are dependent largely on diathermy and the intrauterine ionization. For the improvement of inflammation of the adnexa in general, peri- or parametritis or hematocele, I must point out the dangers of radium, which can be advantageously replaced by diathermy and x-rays in measured doses of feeble penetration, given at different intervals. Thus I obtain the regression of lesions. The sedative and antiphlogistic power of physical agents diminishes gradually the indurated exudates and restores, in some cases, the physiologic uterine mobility. In other cases, with more pathology, the surgeon must step in. Later on, for adhesions, physical means may with advantage be resorted to.

The chief effects of the diathermic current are the diminution of vitality of the microorganisms and the activation of the normal cellular biochemical processes. The radiosensibility of the thermopenetration is like that of the x-rays and high-frequency, selective on the histoneoplastic elements. This selectivity has been lately established as a law, after it was brought to notice for cancer cells, in my work of 1900 (Congress of Paris), and in 1903 (Paris Academy of Medicine).

Diathermy has also a hemostatic, coagulative, sterilizing, and destructive power which, in gynecology, is frequently of the greatest value. Thus it is that for the treatment of cancer of the neck of the womb it powerfully aids the roentgen-rays which, in addition to their possible selective action on the cancer cells, tend to prevent extension along the pelvic lymphatic ganglia.

In simple ulcerations of the endocervical neck, with congestion of the organ and purulent discharge, electrothermopenetration procures with prompt cicatrization, a uterine decongestion, complete enough at times to render possible an ultimate fecundation, as pointed out in many German works.

The heat created by diathermy in the matrix and its adnexa ameliorates menstrual pains, ovarian hyperesthesia, and obstinate vaginismus. Thanks to the vascular drainage, the nervous stimulation, and

the improved metabolic balance, the nutrition of the cells is modified and brought more nearly to normalcy. Diathermic applications (twenty to thirty minutes) give to the uterus, the sensation of an agreeable internal heat, coinciding with the relief of pain. By their resistance, the tissues transform the current into calorific energy. The vagina offers an ideal field to physical therapy for the employment of diathermy, but the rectal avenue and the abdominal wall can also be used concurrently.

Actinotherapy often relieves amenorrhea and dysmenorrhea; it is of benefit to troubles of the menopause. It is also successful in some cases of sterility, but my advice is not to limit the method to the ultraviolet rays; the infrared rays should be alternated with them.

What strikes the observers of physical therapy in general, is the revival of vital energy, the suppression of insomnia and hypochondriac tendencies.

In the treatment of certain uterine fibromas, notwithstanding its unquestionable activity, the possible precision of its localization and its dosage, the chemocaustic ionization method of Apostoli is being, little by little, abandoned at the present time. I personally use the combined action of the roentgen rays and mild intrauterine ionization. This combined method, which I have employed for thirty years for fibroma uteri, involves no risk if carefully done. The association of intrauterine galvanotherapy with mild radiotherapy is painless.

What most impresses the first experimentors in these methods, is the inhibitory power of the irradiations on the loss of blood. The disappearance of metrorrhagia and the reduction in volume of the tumors are sometimes followed by the anticipated menopause which announces itself by flushings. The cessation of the periods is only temporary; however if they reappear, the fibroma may be seen to enlarge, but yields to some supplementary irradiations. The functional sterilization of the ovary, with the regression of the tumor often assures the return of the uterus almost to its normal dimensions.

The hemorrhagic fibroma of medium size and the fibromatous uterus with their radiosensitive cells, benefit greatly by the combined method. Surgery has its field, so has physiotherapy, in treating selected cases of fibromas of the uterus.

Uterine cancer.—At the first International Medical Congress of Electrology and Radiology, held in Paris in 1900, I pointed out that high-

frequency scintillations have a selective power of destruction (which I called a cytolic action) on the cancer cells, while they stimulate the normal tissues in their fight against the enemy. At that time, I gave several examples of cancer cured or ameliorated, not only by that method of application of high-frequency energy, but also by what was afterwards called fulguration and electrocoagulation. I mentioned one case of epithelioma of the neck of the womb treated by needles connected with the little D'Arsonval solenoid and implanted in the cancerous tissue, which was nothing more than electrocoagulation. I employed the word coagulation.

In 1903, at the Academy of Medicine in Paris, I stressed the selective action of x-rays used in strong doses to attack cancer cells, and to prevent extensions after surgical removal of the mass. In order to prevent a return, high-frequency effluves and x-rays could advantageously be applied in the open wound during the operation and locally at different intervals after the wound had been closed.

When we can act at an early stage, beneficial results are frequent, and sometimes even in certain advanced cases, palliative effects can still be obtained. In the inoperable cases, where the most audacious surgery is powerless, much relief may be obtained by physical means.

The physical therapeutist, conscious of the powerful agents at his disposal, must not become so enthusiastic as to treat every case. Physical agents are most useful adjuvants, to both physician and surgeon, and often a real boon to many sufferers.

THE RUPTURED UTERUS*

By Asa B. Davis, M.D., F.A.C.S., New York, N. Y.

SEVERAL months ago our secretary requested a paper on rupture of the uterus to be read at this meeting. In responding to that call I am somewhat influenced by the suggestions made from time to time that, where the results of a particular study have been presented, it would be advantageous to continue the study and make subsequent reports to this Association.

In 1909, Dr. Ralph Waldo Lobenstine read a paper entitled "Rupture of the Uterus During Labor." His study was based upon the examples of this accident to be found in the records of the Lying-In Hospital, New York, from the years 1890 to 1909, representing a maternity service of some sixty thousand confinements during that time. His paper was published in our *Transactions* of 1909, and also in the *Bulletin of the Lying-In Hospital* (Vol. vi, No. 2).

I am indebted to Dr. James A. Harrar for his laborious and painstaking work in searching the records of the Lying-In Hospital from the time of Dr. Lobenstine's report to date.

Rupture of the uterus is a very broad term and rather devoid of enlightenment unless we know the condition of the patient, the character of the pregnancy, labor and its management, which preceded the rupture in every case.

It is doubtful if one can practice obstetrics for more than a short time before being impressed by the varying characteristics of each individual patient; their nervous poise, endurance under stress, the widely different character of their skeletal muscles and the form of the bony skeleton. Thus, a given patient will bear several children, her abdominal muscles developing and distending to meet the requirements of the progressing pregnancy. In the process of general involution following delivery there is a recoil of these muscles, they soon resume their proper place and function and approximate the prepregnant bodily configuration. In another case the abdominal muscles begin to yield rather early in pregnancy. In particular the recti lengthen and separate widely, allowing undue anteversion of the developing pregnant uterus. After labor involution is slower, the recoil is less and we note an increasingly pendulous abdomen after each succeeding pregnancy and labor. In the lower part of the birth canal we see vast differences in the tensile strength, elasticity and distensi-

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bility of the muscles. One patient will pass through a forceful rapid delivery. The vagina and vulva outlet will become dilated and distended, delivery being accomplished with little or no injury or laceration, the muscles soon regaining their normal tone. We meet examples of the other extreme wherein the progress of labor is slow. The presenting part barely reaches the pelvic floor and begins to distend the perineum and vulva outlet when, despite the use of all caution and skill in attempting to control and regulate advance, laceration suddenly occurs like tearing through wet paper, exposing the sphincter and lacerating the cutaneous covering of the perineum near or quite to the anus.

We know that some of the most disabling lacerations occur without visible breaks in the continuity of the mucous membrane of the vagina and perineum or the neighboring skin.

Age is another factor worth considering. There are a certain number of primiparae in the late thirties or early forties in whom distention will progress for a time, laceration occurring suddenly. In these cases, lacerations are usually along clean-cut lines.

Within the past few weeks the writer has been called upon by a young woman twenty-three years of age, and ten months after the delivery of her first child, to correct by extensive operative repair, well marked cystocele, rectocele and complete procidentia. It is not probable that prolonged labor and forcible instrumentation were entirely responsible for her condition.

May we not fairly argue that like variations obtain in the uterine muscles and in the mechanism designed to support and maintain the uterus in its proper axis and position?

In looking through the standard works on obstetrics under the caption "Rupture of the Uterus," one does not read far before meeting an attempt to estimate the relative frequency of the occurrence of this accident in labor. Williams states that it occurs once in every five hundred or a thousand cases. DeLee states that Freund, from the collected reports of seventeen authors, found one rupture to 2114 cases, but the individual reports varied from one in two hundred and thirty-four, to one in sixty-one hundred cases. Some of the older writers mention the subject and recognize the difficulty of estimating as to how often it occurs, because reports of the cause of death are often evaded, omitting the point that the rupture had occurred, or else many cases go unrecognized. In conclusion they state that we must turn to the maternity hospitals for accurate records. We begin to read hopefully in Craigin's *Textbook on Obstetrics* in which he says that in a series of twenty thousand consecutive deliveries at the Sloane Hospital, there were thirty cases of ruptured uterus treated. Fifteen of these occurred outside of the hospital and were admitted with this complication. If all cases at the hospital were considered,

it would make a frequency of one in 666⅔ cases. If only those occurring in the hospital were considered, the frequency would be one in 1333⅓ cases.

Without delusions or any degree of enthusiasm or satisfaction, we report 184 examples of rupture of the uterus occurring in the service of the Lying-In Hospital, New York, from 1890 to September 1, 1926, representing a service of 155,395 cases. For this purpose we include the 78 cases to be found in Dr. Lobenstine's article, the remaining 106 having occurred since 1909.

The total number of confinements, as stated, is not exact, owing to the fact that in our serial number (known in the records as "Confinement Number") there are included abortions, tubal pregnancies and hydatidiform moles. From other studies of our statistics it is fair to estimate that 5 per cent of the 155,395 confinements include these three classifications. Although it would be a tremendous task to segregate these cases, to refrain from doing so would be slipshod, were it possible to make the remainder of the study exact. Reducing our total number of cases by 5 per cent, or 7,770, we have 147,625 estimated actual confinements, with an incidence of rupture of the uterus as one in 810.

Without attempting too fine distinctions, it may be of interest to carry this analysis one step farther. Our records show that there were 91,208 confinements from January 1, 1909, to September 1, 1926. After making the 5 per cent deduction as before, discarding for the moment the 54 emergency cases and the 24 ruptures through cesarean scars (the latter being in uteri already artificially weakened), there remain 28 cases out of the total 106 which we report, which were entirely under the care of the hospital, an incidence of one in 3257⅐.

The maternity hospitals cannot fairly estimate the relative frequency of this accident. They treat a greater number than is found in the community at large. Dr. Craigin reports that 50 per cent of the cases occurring in Sloane Hospital were emergencies brought in from outside. Of the 106 cases which we report, 52 were regular applicants and 54 emergencies sent in by midwives and private doctors. It should also be noted that complicated cases gravitate to hospitals.

Tables I and II show the incidence of rupture of the uterus as to parity and age. In the 106 cases there were but 8 in primiparae, all of them complete ruptures. The largest number is 16 in para iv. The parity ranges from 1 to 13. The range of age is from nineteen to forty-eight years. Twenty-seven occurred in the half decade between thirty and thirty-five years, 22 being complete ruptures. (Tables I and II.)

Following the usual classification, we have 88 examples of complete rupture of the uterus. Of these, 47 mothers died and 41 recovered.

TABLE I. RECORD OF PARITY

64 COMPLETE RUPTURES		24 RUPTURED CESAREANS		18 INCOMPLETE RUPTURES	
No.	Parity	No.	Parity	No.	Parity
8	I	9	II	2	II
6	II	5	III	1	III
6	III	2	IV	4	IV
10	IV	3	V	2	V
6	V	2	VI	3	VI
9	VI	1	IX	1	VII
2	VII	2	XIII	1	VIII
4	VIII			3	IX
4	IX			1 Parity not noted.	
2	X				
1	XI				
6 Parity not noted.					

TABLE II. RECORD OF AGE

15 to 20	20 to 25	25 to 30	30 to 35	35 to 40	40 to 45	45 to 50
		64 Complete Ruptures				
	6	15	14	13	8	1
		(In 7 cases the age was not noted)				
		24 Ruptured Cesareans				
1	9	3	8	2		
		(In 1 case the age was not noted)				
		18 Incomplete Ruptures				
	2	3	5	5	2	
		(In 1 case the age was not noted)				
1	17	21	27	20	10	1

There were 75 stillbirths, 13 children lived. In the 18 cases of incomplete rupture, 10 mothers died and 8 survived; 11 children were stillborn, 6 lived and no note is found in the case of one child.

Included in the total of 88 complete ruptures are 24 which occurred through former cesarean scars. Twenty-one of these mothers lived, 3 died and 5 children survived.

Among the 64 cases of complete rupture, other than those through cesarean scars, 44 were emergencies. Thirty-four of these mothers died and 10 lived. Forty-two children were stillborn, 2 survived. Of the 20 regular applicants, 10 mothers died and 10 lived. Fourteen of the children were stillborn, 6 lived.

In the 18 cases of incomplete rupture, 10 were emergencies. Five of these mothers lived, 5 died. Eight children were stillborn and one survived. Among the 5 regular applicants 3 mothers died and 2 lived. Two of the children were stillborn and 3 lived. In 3 cases it was not noted as to whether they were emergencies or regular applicants. Two of these mothers died and one lived. There was one unclassified stillbirth, one child who lived and one case which is not noted.

We find it impossible to give an adequate idea of the 106 examples of this complication without presenting an extract of the history in

each case. This is not feasible. In this list are to be found examples of almost every form of ruptured uterus that has ever been recorded.

Among the cases of complete rupture, we find as a contributing cause at least two cases of former ventrofixation, three of placenta previa and two with fibroids in or near the cervix. There are several cases of accouchement forcé on account of prolapsed cord, also one in eclampsia. In one case six months' pregnant, rupture occurred while the patient was straining at stool. Supravaginal hysterectomy was promptly done, the patient being discharged from the hospital on the eighteenth day postoperative. There were two cases admitted with complete rupture, on whom version and partial breech extraction had been done, leaving a decapitated head in the uterus. Another was admitted four days after delivery, septic. Her pulse was 140, temperature 105° and there were fifty-six ounces of urine in the bladder. We note two cases admitted after delivery infected with Bacillus aerogenes capsulatus. We are often tempted to suture these wounds or rely upon packing the uterus. In four instances in which the wound was sutured one patient survived. Hysterectomy is the operation of choice and was employed in the cases of 32 of the 64 patients. The sooner this operation is performed after rupture has occurred, the better are the chances for recovery.

While rupture through the cesarean scar in a subsequent pregnancy is a serious accident, we find that the prognosis for the mother is far better than in the other cases of complete rupture. Of the 24 mothers included in this group, 21 recovered. For the baby the prognosis is bad, we were able to save only 5 of the 24. In 4 instances subtotal hysterectomy was done, 2 of the 3 maternal deaths following this operation.

It is often very difficult to calculate the duration of pregnancy in the class of patient with whom we deal because comparatively few of them pay much attention to the date of their last menstruation. In practically every one of these cases rupture occurred at or near full term. We find that many patients allow themselves to go on in labor for several hours before notifying a doctor or reporting at the hospital; notwithstanding the fact that they had been repeatedly warned of the danger involved by neglecting to do so. They explain that they hoped to be delivered in the normal way. In some cases the interval was short between the onset of labor and occurrence of rupture. One patient was awakened at two o'clock in the morning by a sudden pain (C. N. 29691). She arrived at the hospital from a considerable distance an hour later, pulseless and, while being admitted, respirations ceased. Artificial respiration was done by the admitting nurse and I, being in the hospital at the time, was notified. All haste was made to begin operating, at the same time assistants were giving intravenous salt solution. When the abdomen was opened it was

found full of clots, with the child and placenta free among the intestines. The child, placenta and clots were hastily removed and the edges of the rent in the uterus freshened and sutured. The patient lived and was discharged from hospital on the fourteenth day. Two and a half years later she was delivered of a living child by cesarean section.

In many of these cases we find considerable hemorrhage and well marked shock; while in others comparatively little bleeding occurs, separation having taken place, the wound is plugged by the placenta. In some there had only been slight union of the muscles following the previous cesarean, and the rent occurs through scar tissue which does not bleed seriously. We believe that the best treatment for these cases is to freshen the edges and resuture the wound, ending the operation as quickly as possible and postponing further operative procedure, such as hysterectomy or sterilization, until some future time when the patient will probably be in better condition.

Any patient who has been subjected to cesarean section should be in the hospital a week or ten days before expected full term in a subsequent pregnancy. And, where it is known that a patient must again be delivered by this operation, it should be done before the onset of labor. In this type of rupture we are dealing with a very different proposition from the conditions which are found in the ordinary complete rupture. These wounds are not infected; they are limited to cesarean scars, and the tissues about them have not been unduly stretched and contused.

In the eighteen cases of incomplete rupture we find five placenta previas; one case of hydrocephalus; two cases of face and one brow presentation; two accidental hemorrhages and one in transverse presentation, and one extension of old cervical laceration, marked Bandl's ring, unsuccessful high forceps and version. Six cases were admitted after having been delivered by midwives or private doctors. Version was done or attempted in ten instances, hysterectomy in six.

It must be acknowledged that rupture of the uterus does occur and that it will continue to occur. It behooves us to put forth every effort in order that it shall happen as infrequently as possible.

At our 1917 meeting I advised: "The time to treat eclampsia is before it occurs." Not that that statement has had much influence, yet eclampsia is rapidly being brought under control.

A vast amount has been written about the treatment of puerperal sepsis. The results are not brilliant in serious cases. Is it not high time to pay more attention to the prevention of this condition? It is rarely met with now in the wards of well conducted maternities. Make such results general. The time to treat rupture of the uterus is before it occurs. In the last analysis it means better, more conscien-

tious and systematic care during pregnancy, labor and the postpartum state.

Patients should come under observation earlier in pregnancy. A careful history is most important. It should not be possible for a patient to give histories of repeated consecutive stillbirths. The history of giving birth to unduly large children is worthy of note. Patients subject to toxemia in former pregnancies should be carefully watched for its recurrence and treated accordingly. Contracted pelves should be detected early, and probable disproportion between the fetus and pelvic capacity be foreseen long before onset of labor. Obstructing newgrowths should be found, or any previous corrective operation such as amputation of the cervix, suspension or fixation of the uterus, extensive scars in the cervix which will probably check or impede dilatation. Crossbirths and other malpositions should be detected early in labor if possible, and means taken to correct the position or hasten delivery before danger of rupture, which is very liable in these cases. In placenta previa, where the internal os is largely or entirely covered with the placenta, patients are entitled to early cesarean section. Cases of prolonged labor without advance, with developing tonic contraction of the uterus, flattening out of the abdomen, irregular in form, showing Bandl's ring obliquely across the abdomen with round ligaments standing out in bold relief, often with the cervix caught between the presenting part and the back of the symphysis, mean that the lower uterine segment is being unduly thinned and made tense, and that rupture of the uterus is impending. Often at this time the bladder will fill rapidly and unless emptied gives added strain. Such cases should be delivered without delay. With the lower part of the uterus stretched almost to the tearing point, it is not a good time to suddenly add a rapidly acting force such as pituitrin. Early transfusion will help to save more of these cases than was possible formerly.

COMPARISON OF METHODS USED IN TREATMENT OF MALIGNANCY*

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(From the Cleveland Clinic)

ANY consideration of the treatment of malignant tumors, wherever situated, must center about the following queries: (1) Is the condition operable or inoperable? (2) If inoperable, what palliative method will give the greatest comfort to the patient? (3) If the case is operable, what method will most completely remove the growth and provide against its extension? A discussion of the treatment of malignant tumors must include also conditions generally considered as premalignant, since it is impossible to state with finality in any case at what moment the transition from premalignancy to definite malignancy will be made.

With the rapid development of methods for the application of the roentgen ray and of radium, together with the ever-present possibility that in the many laboratories devoted to the study of cancer some new and effective measure may at any time be developed, it is obvious that the surgeon, while maintaining as an inflexible standard of procedure the radical removal of the premalignant and of the malignant lesion, if operable, must maintain at the same time a flexible standard as to the method for such removal; that is, a standard which may be modified or changed in the light of his own accumulated experience and of new developments in treatment.

Among the premalignant conditions with which the surgeon should be prepared to deal are keratoses, warts, pigmented moles, chronic infection of the lymphatic glands, old scars, especially those exposed to irritation, cracks and fissures of the lip, ulcers of the tongue and cheek, benign papilloma of the larynx, benign bronchial tumors, fetal adenoma of the thyroid, cysts and other benign tumors of the breasts, chronic ulcers of the stomach and rectum, benign tumors of the uterus, and such lesions as laceration or inflammation of the cervix. Any of these conditions when first seen by the surgeon appear to be unquestionably benign, but he should always bear in mind that they carry with them a potential malignancy. The sine qua non in dealing with any of these premalignant conditions is that it should be completely eradicated or let alone. Partial eradication of any of these conditions may mean the lighting up of a previously harmless condition into a

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rapidly growing malignant process. A long list of examples might be given, but it is sufficient to cite here only such outstanding instances of unfortunate sequelae as the precipitation and dissemination of a fatal malignancy after the incomplete dissection of a pigmented mole by the use of the electric needle, or the development of carcinoma of the breast after the partial removal of a precancerous, benign tumor, or of a chronic cystic mastitis.

The problem presented to the surgeon by the patient with a definitely malignant lesion is simple as compared with that presented by the patient with a potentially malignant condition. Once a decision has been made as to whether in the individual case a possibly premalignant condition is to be eradicated or let alone, it is important in either case that the patient be inspected at frequent intervals just as after the removal of an established cancer. The surgeon should be guided in his decision as to his procedure in any individual case by the age of the patient, that is, whether or not he is in the cancer period of life; by the presence or absence of a familial history of cancer, for there is still too much uncertainty regarding the inheritance factor for the possibility that such a factor exists to be ignored; and third, by the degree of possibility that adequate relief will follow the removal of the condition.

Radium, or roentgen ray, or surgical operation is to be employed according to the location or character of the precancerous lesion. When such lesions are readily accessible, as on the face, tongue, nose, cervix, and lower rectum, radium alone or a combination of roentgen ray and radium is usually to be preferred. In cases of benign tumors of the breast, or ulcers of the stomach, wide excision is the method of choice.

Once the malignant condition has developed, then, as stated above, the first decision to be made by the surgeon is whether the condition is operable or inoperable and then the method of choice under either condition must be determined. No general rule can be given which can apply to malignant conditions in every part of the body. In this discussion, therefore, we shall consider the various malignant conditions according to the organs and tissues involved.

Malignant Conditions of the Skin.—Malignant conditions of the skin, like premalignant conditions, are best treated by radiation.

Malignant Bone Tumors.—The Registry of Bone Sarcoma, conducted by the American College of Surgeons, has accumulated extensive data, on the basis of which it appears still to be uncertain whether a primary malignant bone tumor should be treated by surgery or by radiation. Pre- and postoperative radiation by the x-ray is certainly indicated. If the condition is in the limb and is not obviously inoperable, amputation should immediately follow radiation. In the case of a metastatic tumor of the bones, palliative treatment by the

x-ray is the only measure. Radium is contraindicated, as it will destroy the periosteum and necrosis will result.

Malignant Conditions of the Mouth.—Malignant disease of the mucous membranes of the mouth should be treated by wide excision. The very early stages of cancer of the tongue should be treated by excision, electric coagulation, or the electric cautery; late stages, by excision together with block dissection of the glands of the neck. Cancer of the lip, if seen in its early stages, should be treated by radium; in its late stages, like late stages of cancer of the tongue, by wide excision and by block dissection of the gland-bearing areas of the neck.

Carcinoma of the Larynx.—In dealing with carcinoma of the larynx, the problem of the surgeon is simpler than in the case of cancer in almost any other part of the body. Cancer of the larynx is usually discovered in its earliest stages, for the voice of the patient at once makes obvious the presence of a condition which demands attention, so that he promptly seeks the physician or laryngologist for relief. Moreover, intrinsic cancer of the larynx is inclosed within a practically impermeable cartilage box so that the process can be completely removed with the larynx, the only permanently disabling result being the loss of voice, which in our cases has been amply compensated for by the development of a buccal whisper. In cases of extrinsic carcinoma of the larynx the situation is not so favorable. In such a case, removal of the larynx together with block dissection of the contingent gland-bearing areas is indicated if the condition is operable; if inoperable, tracheotomy with radiation is indicated. In the case of either an intrinsic, or an operable extrinsic carcinoma of the larynx, however, postoperative radiation should be applied; in the former instance, since it is always possible that some malignant cells may have escaped into the surrounding tissues, and in the latter the danger of dissemination is obvious.

Malignant Diseases of the Thyroid Gland.—Since approximately 95 per cent of all malignant diseases of the thyroid gland are due to a degeneration of a fetal adenoma, it is evident that if all fetal adenomata were removed as soon as their presence was discovered, malignant diseases of the thyroid would be practically eliminated. The presence of a fetal adenoma is readily determined. It is present from birth, is a discrete tumor, usually unilateral and freely movable. It is the easiest of all types of goiters to remove. Once malignant changes have taken place in the gland it should be removed surgically if possible, otherwise it should be treated with radium. If the malignant process has developed to the inoperable stage, a decompression operation will give temporary relief from obstruction and the resultant partial asphyxiation, this operation being followed by radiation. A patient with an inoperable carcinoma of the thyroid will live

without radiation for approximately a year. There is, at present, no basis upon which to found a judgment as to the length of life when such a case is treated with radiation. In all cases of malignant diseases of the thyroid, however treated, the possibility that myxedema will develop should be borne in mind. This condition, however, is readily met by the administration of thyroid extract.

Malignant Diseases of the Breast.—There has been a great deal of discussion during recent years regarding the relative values of radium with deep roentgen-ray therapy and radical operation in the treatment of breast carcinoma. These discussions have centered upon three phases of the problem: (1) the value of preoperative radiation, (2) the value of postoperative radiation, (3) the value of radiation in preference to surgery.

As for postoperative roentgen-ray therapy, at the present time we do not favor its use. Dr. Portmann, in his study of our statistics, found that 35 per cent of the cases in which postoperative radiation was applied showed recurrences in the first year after operation, whereas only 16.5 per cent showed recurrences in the first year when no radiation was used. The scope of this paper does not permit time for discussion of what may be the reasons for these untoward results of postoperative radiation excepting to state that it is probable that such malignant cells as, especially in advanced cases of carcinoma of the breast, must often remain after even the most radical removal of the gland-bearing areas, are lighted up to increased activity by the radiation, or else that the natural resistance of the cells is interfered with.

As for the use of radiation in preference to surgery, it is not justified at the present time excepting in the cases of patients who for any reason refuse operation. If a case is completely inoperable, radiation may be applied as a palliative measure. Dr. Portmann has found that he has had inoperable cases who have lived comfortably past a three-year period after radiation alone. Statistical studies of cases of cancer of the breast present one interesting and encouraging fact, as has been shown by Dr. Bunts, who from a study of our total series of breast cases found that there was "apparent reversal during more recent years of the incidence relation between benign and malignant tumors. It would seem that this might well be attributed to the fact that now earlier consultation is sought by women who discover an abnormal condition in the breast so that it is first seen and the operation performed while the tumor is still benign."

Carcinoma of the Stomach.—Carcinoma of the stomach is one of the most discouraging conditions presented to the surgeon. Its rapidity of growth, and the rapidity with which lymphatic involvement is extended may lead to the establishment of an inoperable status at a very early period in its progress. A period of only a few weeks may

carry the patient from an operable to a completely inoperable status. Surgery is the only available method in the treatment of these cases. If the condition is operable, resection with the widest possible excision of the growth is the indicated procedure, together with the application of every restorative measure which is at the disposal of the surgeon, blood transfusion, saline injections, minimum anesthesia with nitrous oxide which should not pass beyond the stage of analgesia, and divided operation. We have found recently that the application of diathermy during and after the operation is of material aid in increasing the resistance of the patient, by its directly conserving effect upon the function of the liver.

The relation between ulcer of the stomach and cancer remains to be finally established. Nevertheless, patients with ulcer of the stomach should be given the advantage of complete removal of the ulcer by operation. The reason radiation cannot be applied in these cases is because it is impossible to deliver sufficient radiation to the stomach to destroy a malignant process without harming the adrenals and the liver, so that radiation impairs rather than improves the prognosis.

Carcinoma of the Esophagus.—Carcinoma of the esophagus is best treated by radium applied through an esophagostomy. Deep roentgen-ray therapy is not applicable in these cases, as the radiation may produce a fibrosis of the lung.

Carcinoma of the Large Intestine and Rectum.—At the present time, as the result of a combined investigation by the radiologists and surgeons of the Cleveland Clinic, we have adopted the following tentative conclusions: We are constantly studying our results, and these conclusions and procedures will be modified as these investigations may indicate.

Cases of carcinoma of the large intestine and rectum should be operated upon if possible and radiation should be applied after the operation, excepting in cases in which the growth is low enough in the rectum to be readily accessible, when the implantation of radium needles and the application of radium packs may be sufficient. In all cases in which operation is performed, however, a colostomy followed by radical operation is indicated; in inoperable cases, colostomy plus radiation is indicated. A period of about ten days should elapse after the colostomy before any decision regarding the method of treatment is made, as that period is necessary to allow the inflammatory reactions of the disease to subside sufficiently for an exploration to determine the operation to be made. In many cases the entire picture may change during this period of rest. After the decision is made, either the radical operation or radiation is applied. Following the radium treatment deep roentgen-ray therapy is applied by the cross-fire method. In recurrences after operation, radiation is of trivial value. In recurrences after radiation, surgery is of trivial value.

In the case of cancer of the small intestines, which fortunately is of very rare occurrence, radiation is of little avail and the case should be treated like cases of carcinoma of the stomach.

Carcinoma of the Uterus.—The treatment of carcinoma of the fundus at the present time offers little basis for discussion. Surgical treatment still offers such results that thus far the attention of radiologists has not been extensively directed to its treatment. In inoperable cases, however, deep roentgen-ray therapy offers palliation and prolongation of life, and it may be that accumulating experience will show that these cases, like cases of carcinoma of the cervix, may well be yielded to the radiologists.

For carcinoma of the cervix the method of choice at the present time is radiation. Apparently the results of the radiation treatment of carcinoma of the cervix have not been equaled in any other field. The preferred method is a combination of radium and the roentgen ray, the former being the more important factor. Deep roentgen-ray therapy, however, is an important adjunct in building up the radium dosage at a distance from the cervix itself.

Malignant Tumors of the Genitourinary Organs.—Malignant tumors of the kidney and of the testes are treated by surgery plus radiation both before and after the operation. In many cases tumors of the kidney will diminish so rapidly in size that cases which have seemed to be inoperable become readily operable. Tumors of these organs should be radiated no matter how hopeless the outlook.

In cases of bladder tumor radiation appears to have been of some value but the results are too uncertain for this method to be depended upon. Surgical removal, therefore, remains the method of choice. Postoperative radiation, however, may be used, principally because of the hope that it may be of avail rather than because of any definite results that have been secured up to the present time.

As for malignant tumors of the prostate, the same conditions hold as in the case of bladder tumors. In cases in which a high blood urea makes operation too hazardous, radiation may provide the only method of treatment and in certain cases may tide the patient over until the radical operation can be performed.

It will have been noted that throughout this discussion no reference has been made to any form of treatment excepting surgery and radiation. Serum therapy has been proposed from time to time and has been as frequently discarded by those who have investigated its possibilities. During recent months the investigations by W. Blair Bell of Liverpool have revived interest in the possibility of the use of colloidal metals, of lead in particular. Following his lead we have been applying colloidal lead solutions in certain inoperable cases but, although it is too soon for us to make any definite statement regarding

our results, up to the present time they have not been encouraging. As far as this method is concerned we must for the present take Blair Bell's own position that "the time is not yet ripe for the general employment of lead, for a vast amount of work, experimental and therapeutic, still remains to be accomplished."

OBSERVATIONS ON HEART DISEASE COMPLICATING PREGNANCY*

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TO SOME it may seem that the problem of heart disease complicating pregnancy is settled. To us it seems otherwise.

Our interest in this subject dates from 1915. In that year one of us (Kellogg) collected and studied all these cases that had entered the Boston Lying-In Hospital since 1873. A study of the literature was made at the same time. It was found that almost invariably cases entered the hospital only after decompensation and that the maternal mortality in these decompensated cases was 45 per cent. The literature was found to consist for the most part of vague generalities.

Our prenatal clinics had then been in operation four years and a study of the work of these clinics in relation to cardiac disease in pregnancy showed that they had so far helped little in improving this truly frightful mortality.

Obviously we were confronted by a problem and for the five years 1915 to 1920, somewhat impeded by the war, we tried to meet it by various phases of what we have called the "casual consultant system." This system covers the individual needs of any special cardiac emergency case very well. But modern obstetrics, as is well known, demands that every pregnancy case receive prenatal and postnatal care, and it logically follows that pregnant women with cardiac disease deserve repeated consultations between obstetrician and heart consultant. The "casual consultant system" is, therefore, ill suited to the standards of a modern pregnancy clinic including any large number of cardiac cases. Nor does that system tend to make possible the collection of accurate data, which is a necessary function of all modern clinics.

When, in recent years, special cardiac clinics grew up in the general hospitals, this hospital (and other obstetric hospitals elsewhere did

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likewise) took advantage of the opportunity and affiliated with a neighboring cardiac clinic This proved of great benefit, but necessitated a patient's attending two separate clinics, and as can easily be seen there were difficulties in the transfer of records from one clinic to the other and hence delay in consultation; also a gap was left in consultations and in record keeping during the patient's stay in hospital (during confinement and puerperium and during preparation for confinement, which among the cardiac cases often necessitates prolonged rest in hospital).

The ideal system, to which the "casual consultant" and the "consulting clinic" leads, is clearly a special cardiac clinic within the lying-in hospital.

In 1921, a policy was tried in this hospital of grouping certain cases, representing a few of the more prominent obstetric problems, in special services, and assigning each group to different members of the staff for intensive study during the period of a year. For example, in one group bleeding cases were placed, in another, cases of toxemias, in a third, cases with complicating heart disease, with only the last of which we are concerned. The formation of this special service for pregnant cases with heart disease led by degrees, with the increasing interest and experience in the difficulties of this special problem, directly to the formation of the cardiac clinic in conjunction with the hospital's prenatal clinics, and its growth to its present proportions. The present clinic, then, represents not a preconceived plan forced upon the hospital, but the result of a natural need, and actual experience in meeting this need.

Yet in 1924 there were but two such clinics, to our knowledge, within lying-in hospitals exclusively for the treatment of women with heart disease complicating pregnancy.

Hence we feel justified in our belief that the subject is not yet settled. To date under this system from 1921 to 1926, 882 patients have passed through this clinic or have come into the house as emergencies. Practically all these cases have come under the repeated observation of the cardiologist. They were referred on the basis that each had something suspicious of cardiac disease. Of the 882 cases, 218, about 25 per cent, proved to be true cardiac disease, most of them rheumatic heart disease, class one.

It is on this material, together with our own cardiac cases and consultations in a not inconsiderable number of private cases, that the following observations are made.

In spite of this experience we do not yet feel that the material warrants minute analysis and a setting down of final conclusions and we, therefore, prefer to consider this in the nature of a preliminary paper, and to make certain observations which seem true, and to discuss certain moot points in the obstetric handling of these patients.

Approximately 7.5 per cent of the whole pregnancy clinic shows something in the history or physical examination to require a decision on the heart condition. These patients can be readily sorted into: (1) A group that has *no true evidence of heart disease,* but complains of breathlessness, rapid heart, heart pain, fainting, giddiness, etc. They can be classified as *cardiac neurosis* or *neurasthenia.* Such cases do not develop heart failure and on the whole do well through pregnancy without any special care of the heart. Many of this group are unhappy and disabled by their symptoms. They deserve for their comfort, reassurance and hygienic regime.

(2) There is another group of patients with systole murmurs, or doubtful enlargement, third heart sounds, or extrasystoles; or some combinations of these findings. It is impossible to say certainly that they have no heart disease. They are *"possible"* or *undiagnosable hearts.* Such patients, if classified as having no significant disorder of the heart and handled with no special medical precaution except special observation of the cardiac vascular condition, have been found to go through pregnancy without developing heart failure. They do as well as normal patients.

(3) The residue, patients with *significant heart disease* shown by gross enlargement, diastolic murmurs, signs of true decompensation (congestive heart failure) or a significant disorder of the heart beat such as auricular fibrillation, or some combination of these findings, form from 1 to 2 per cent of all pregnancy cases.

A small number of this group have cardiovascular syphilis or congenital heart, or disorders of the heart beat, such as paroxysmal tachycardia or paroxysmal auricular fibrillation. Each one of these groups deserves special treatment in so far as the problems of pregnancy are concerned. They are comparatively small groups and we will not discuss them here.

By far the greatest number of patients with significant heart disease complicating pregnancy have *rheumatic heart disease* with mitral stenosis or aortic regurgitation, or both. As a rule they are patients who contracted their disease in girlhood and adolescence, and represent the successful cases that have gone through to adult life. This group affords a distinctly greater risk of maternal death and loss of baby than normals. They deserve careful following through pregnancy by specially trained internist and obstetrician working together.

One cannot generalize on the control of this group very satsifactorily. But there are certain broad principles which seem clear to us from our experience.

When shall we advise a woman with a heart disease not to become pregnant?

This question unfortunately seldom comes up for decision. But a patient with a serious heart condition should be warned that: (1) She takes a risk, approximately of 5 per cent of death during pregnancy or puerperium. (2) She takes a larger risk, possibly 10 per cent, of surviving but of failing to have a live baby at the end of her pregnancy. (3) She takes a less clearly statable risk of permanent or prolonged temporary disability. (4) She must (in order to keep her risks as low as the above figures) be prepared to follow explicitly rules of rest through pregnancy, and go to the hospital at once on the signs of failure and to consent to interruption of pregnancy on indications. If she has certain signs, which will be discussed under the next heading, she should be advised against pregnancy as promising a much greater risk than the above.

When do we advise interruption early in pregnancy for cardiac complications?

(1) For a patient who has or has had clear signs of congestive failure. (2) For a patient who has a complicating nephritis or hypertension. (3) For a patient who has auricular fibrillation, absolute disorder of the heart beat. (4) For a patient who has had a recent or has at present a rheumatic fever.

From our experience it is unlikely that a woman who has any one of these complications can survive pregnancy, though we have seen individual cases in all these groups survive.

Where any of the above complications occur in mid or late pregnancy, it has been our custom to try prolonged rest in a hospital under medical treatment directed to the heart in an endeavor to secure a viable child, except in the cases who develop decompensation which fails to clear promptly on rest in bed and medical treatment.

There is one absolute rule which has appeared clear to us. *If a patient with a heart disease develops decompensation during pregnancy she belongs in a hospital till the pregnancy is terminated.* The only clearly avoidable mishaps that we have seen have been among patients where this rule has been disregarded.

The indications for sterilization following delivery are the same, by and large, as those given for interrupting pregnancy. It is, however, in our opinion justifiable to sterilize a patient with a clearly seriously damaged heart who has not yet developed any of these particularly dangerous conditions, providing the patient requests it in the full knowledge of her risk with future pregnancy. The fact that a cardiac has survived one or more pregnancies without decompensation does not justify the assumption that she will continue to succeed.

Though prolonged experience with heart disease complicating pregnancy has shown us clearly that the true cardiacs take a distinctly greater risk than normals, and that this is so in spite of all possible precautions, we have also found that many of the alarming cardiac

symptoms complained of by patients and many of the signs suggesting heart disease are of no consequence whatsoever. On the whole we feel that interruption of pregnancy and sterilization have been performed less often since intensive care and observation of the cardiacs have been accomplished. We wish to emphasize again, however, the fact that cardiacs are a serious pregnancy risk.

Decompensation during pregnancy in cardiac patients previously not disabled occurs: (1) From disobedience of rules for control of activity. (2) From intercurrent disease not predictable and largely not avoidable. (3) Occasionally from a sudden cardiac complication such as auricular fibrillation, which is not predictable. The majority of patients with severely damaged hearts, but without the four particularly dangerous complications mentioned above, prove able to stand pregnancy under proper conditions without apparent ill effects. But the purely mechanical burden of uncomplicated pregnancy is so great that we have many times seen individual cardiac cases who have previously led active lives without any disability and who have followed our advice to the letter through early pregnancy and who have had no complications of pregnancy, forced into decompensation at about the sixth month. And we have seen this decompensation persist even under continued rest in bed and thorough medical treatment. In some cases the decompensation is continued for many weeks after an uncomplicated delivery, and then full activity is returned once the burden of pregnancy is finally gone.

It is clear that the 1 to 2 per cent of true heart disease in pregnancy places this as one of the major problems in pathologic obstetrics. Under present day management it is likely that the "cardiac" in pregnancy is just as common as the case with convulsive toxemia.

We have seen it stated that the cardiac pregnancy case: (1) Has an easy delivery. (2) Miscarries if decompensation occurs. In experience with a long series of such cases, though the first is true in many cases, an occasional disheartening exception is sure to occur. The second, when it occurs, occurs chiefly as an unwelcome complication of a dangerously decompensated case that requires not the added strain of immediate delivery but the greatest possible rest and relief from strain to improve the condition before delivery.

These general observations of cardiac disease in pregnancy are from the medical viewpoint and exemplify the opinions which we, as obstetricians, accept. When we approach the matter of the actual obstetric handling of a given case there is a divergence of opinion. Some of the staff are very prone to resort to abdominal cesarean section under morphine-scopolamine and local novocaine anesthesia, with very frequent resort to sterilization at that time by ligation and burial of the tubes, in true heart disease cases. This is very clearly

shown by the following figures taken from the cardiac index. Nearly 30 per cent of class I rheumatic heart disease cases, multiparous and primiparous, were delivered by abdominal cesarean section. Roughly, 55 per cent of these were delivered under ether and 45 per cent under morphine-scopolamine and local anesthesia. Of the morphine-scopolamine cases approximately 75 per cent were sterilized. Some of us, including the obstetric author of this paper, take issue with this method of treatment on three counts, the first two very definitely, the last with more uncertainty. The first point of issue is the question of anesthesia. We believe ether is the anesthetic of choice, very carefully given, especially in its initial stage, and that the drop open method is the best way to give the ether. The reasons for this belief are that personally we have never seen ether properly administered do a female cardiac any harm, and that we think we have seen scopolamine do harm to such a patient. Second, the element of time. It takes us half as long or less to do a cesarean under ether as it does to do one under morphine-scopolamine and local anesthesia. We think this time element very important in a sick cardiac and in one who is not sick we see no occasion for avoiding ether. The third reason for this belief is that if the twilight sleep excites the patient and one is obliged to change to a general anesthetic in the midst of the excitement acute cardiac failure and death may result. The second point of issue, we believe the majority of multiparous cardiacs are safest delivered by forceps at full dilatation from below with sterilization some months subsequently if it is advisable. In other words, we do not believe it is justifiable to do a cesarean *for the sake of sterilization,* on account of the greater cesarean risk, and incidentally because sterilization done on the nonpregnant uterus is more likely to remain sterile than on the uterus in the pregnant state. The third point of issue is that we believe many primiparous cardiacs who have gone to full term without decompensation can be safely put through a first stage under the common analgesics and delivered at full dilatation with forceps under ether more safely than by cesarean. Which of these opinions is better only a larger accumulation of material will show. Perhaps each has its proper place and we need only more knowledge to correctly apply our procedure to the right case.

In conclusion we believe that there is still much to learn on this subject and that it is essential that every obstetric hospital have a cardiac clinic under a cardiologist and at most one assistant, not a larger personnel, so that one point of view is maintained over a long period of time, with the accumulation of much clinical data, and only in this way we believe the problem of heart disease complicating pregnancy can be truly answered.

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THE DEVELOPMENTALLY UNFIT INFANT*

By G. Van Amber Brown, M.D., Detroit, Mich.

"The rose-seed holds the glory of the rose;
Within its heart sweet summer fragrance hides,
And there each petal's tender blush-tint hides,
Till June bids nature all her charms disclose.

"The sleeping infant's heart and brain may hold
The glorious power that in future years
Shall move the listening world to smiles and tears;
'Tis life potential that the days unfold.

"One act of Will Divine, and lo! the seed
Of growth was sown in young creation's heart,
From Life Eternal hath all life its start
And endless change as changeless law we read." —*Anaxagoras.*

THE problem of the developmentally unfit infant is more and more attracting the attention of parents, educators and the medical profession, for it depends upon the proper prevention and treatment whether the race as a whole becomes better or worse, as the child of today is the citizen of tomorrow. Since the treatment of the infant, prenatal and postnatal, is at present conducted quite to the exclusion of a hereditary consideration, it is the purpose of this paper to make a plea for greater activities by this Society and the medical profession generally along eugenic lines, in considering this topic. The discussion is based upon the proposition that in dealing with this problem greater good is to be obtained from preventive (eugenic), than from curative, treatment.

I assume the developmentally unfit infant to mean one who is hereditarily socially unsuitable, emotionally or intellectually, and not one who merely has defects which are the result of some childhood disease, or somatic mutilations in delivery at birth, or later. H. S. Jennings' recent contribution on the subject of the relative effects of heredity and environment, very clearly points out the fallacy of attributing any vital phenomena exclusively to either force. In the unfit, environment can be credited with about 20 per cent; heredity about 80 per cent.

The choice of course to be pursued in dealing with those that are unfit from environmental causes is comparatively easy, since as phy-

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sicians we must devote our skill and knowledge first to healing the sick and patching up the sort of people that are already born, thus aiding them to acquire social fitness. In the procreative period, if their heredity is sufficiently good and they are self-supporting and able in prospect to support their young, marriage may be permissible or advisable; particularly if their stock was good enough to provide financially for them and consequently does not have to be done at the expense of other people who have all the children of their own they can possibly properly care for.

Concerning the 80 per cent, the hereditarily unfit, the problem should be dealt with solely by preventive measures and not by present-day methods of charity only. For while brute nature slays its thousands, hand to mouth charity will in the end slay its tens of thousands. It has been said, and I think truly, that "unwise charity creates half the misery in the world and charity can never relieve one-half of the misery which it creates." True charity extends not only to this, but to future generations.

BIOLOGIC CONSIDERATION

In our combined goodness of heart and ignorance of biology, we are deceived by the occasional gratifying and amazing results of education and good environment. We seem to believe that rescue homes and orphanages are ends in themselves; on the contrary, they are merely stop gaps in the great stream of human misery. Charity will no more stop that stream than a dam half-way across will stop a river. Even though built entirely across, it only increases the river's weight and power. Such methods can only lead to the downfall of our civilization. We fail to observe that the lowly are mostly the children and grandchildren of the same type which our parents and grandparents cared for, only they are more numerous, while those who care for them are relatively less numerous.

"Without realizing it, we are today playing with life and heredity upon a perfectly stupendous scale. Vast sums of money are appropriated to stamp out tuberculosis, to care for the crippled and deformed. Great institutions are built to screen insanity from public view, until their inmates are 'cured' and returned to society and to reproduction. Hospitals are everywhere established to prolong the life of those to whom nature gave a shackly constitution. Great milk funds are raised for feeding babies born to lives of feebleness, from mothers too weak by nature to suckle their own offspring, and from parents, one or both of whom are too feeble mentally to provide food for their children. Special hospital wards are furnished for bringing charity babes into the world from parents too incompetent to earn money to pay even for their birth, let alone for subsequent rearing."—(Wiggam.)

Professor Karl Pearson, the English biological mathematician, in a recent Cavendish lecture to the British medical profession, said, "Gentlemen, you are enabling the deformed to live, the blind to see, the weakling to survive, and it is partly due to the social provision made for the weaklings. The feebleminded woman goes to the workhouse for her fourth or fifth illegitimate child, while the insane man, overcome by the

strain of modern life, is fed up and restored for a time to his family and paternity. In our institutions we provide for the deaf-mute, the blind, the cripple, and render it relatively easy for the degenerate to leave their like."

The same sad and astonishing spectacle greets us with reference to our noble efforts to reduce the death rate among infants. This has been done with a result positively thrilling in its extent and grandeur; but, we meet with the astounding fact that by saving millions of infants who are inherently too weak to survive the further strains of life, we have directly increased enormously the death rate among the older children. Professor Ploetz has proved that every reduction in the infant rate has caused a rise in the death rate of children from two to ten in Germany, Professor Pearson and Mr. E. C. Snow proved it for England, and all evidence indicates that the same is true in the United States. Indeed, everywhere we turn, we face the startling truth that you cannot defeat nature, merely by putting her again in swaddling clothes. Prenatal culture has been tried since the time of Adam and Eve and it has been a failure. Prenatal care of the mother and careful nursing after birth is another matter. This is of surpassing importance. The mother should be calm, free from worry and overwork, and should make these months a period of joy and happiness. All this influences her nutrition, and helps to keep the babe well nourished. But that is not all. It helps to give the little fellow a proper start, and it is a pity that any babies should ever be born without such a happy prenatal beginning, for happy healthy childhood is the foundation upon which we must build the future. Our profession is seeking for a cure for pneumonia, tuberculosis, cancer, insanity, sclerosed arteries, hob-nail liver and abridged kidneys, yet, should a remedy be found for all these ills we will only have concealed instead of cured the weak spot in the human armor. If nothing else is done we will wreck the very race we have saved. In short, if by increased medical skill and by augmented state support and private charity, we enable the weaklings to survive and propagate their kind, undoubtedly, we shall have a weaker race. On the contrary, every biologist knows that without an eugenic policy as wide as society itself, civilization is self-destructive. After a generation of exact experimentation and study by the biologists and psychologists, we can now say that blood, that is, heredity, will always tell.

Christ said, "Men do not gather grapes from thorns, nor figs from thistles;" an earlier biblical affirmation is that, "Every living thing shall reproduce according to its own kind,—the weak shall beget the weak and the strong, the strong." The old prophets saw this as clear as day, only they didn't call it what we call it,—Eugenics.

People do not expect great speed horses to be born from draft horses, nor prize cattle from scrubs; but, when it comes to the human family many people honestly believe that good children will be born

from bad stock, quite as often as from good stock; that health will come out of weakness; or that while they are born weaklings education and training will put brains into their empty heads. They do not know that wooden heads are inherited, even if wooden legs are not.

We know that one may inherit immunity, or lack of immunity to certain infectious diseases; tuberculosis, pneumonia, typhoid, or influenza. Some individuals' blood or tissues furnish better soil for certain types of microorganisms than is furnished by the blood or tissues of their fellows. Some are immune to insect poisons, while others are very susceptible. Some people will be stung by bees upon the slightest provocation, while others can use them for playthings.

Certain diseases are known to be hereditary: epilepsy, myopia, cardiac-hypertrophy, colorblindness, cataract, Huntington's chorea, feeblemindedness, multiple sclerosis, hereditary ataxia, coloboma of the iris, microphthalmus, hemorrhagic diathesis, polydactylism, orthodactyly, goiter, varicocele, varicose veins, asthma, fragility of bone, mitral insufficiency, idiocy. Not only diseases, but general physical characteristics, as stoutness, shortness, erectness, the Roosevelt smile, and the Hapsburg lip, may be inherited. Furthermore, the child may inherit temperamental traits, as temper, boisterousness, shyness, and specific musical talents. Fortunately our inheritance is not always a hindrance. We may take new cheer from the realization that children may also be endowed through heredity with great mental capacity. The understanding of all this had its origin in the epoch-making discovery of Gregor Johann Mendel, an abbot and biologist of Austrian birth (1822-84).

During eight years Mendel scientifically studied the pea plants in his monastery garden, until the closure of the monastery by the Austrian Government put an end to his experiments. The results of his observations and deductions therefrom were first read before a small company of his neighbors, and later published, in 1865. The importance of this discovery, known as Mendel's law, attracted no further attention until rediscovered by Hugo de Vries in 1900, when together with subsequent discoveries by a number of other scientists, the subdivisibility of each individual into many distinct units, or traits, was revealed, the hereditary sources of which were clearly traceable, leading to various individuals of the family line and not to one individual alone. Furthermore, it was found that the lack of a single trait sometimes appears as a trait itself, just as darkness appears to be a condition, rather than absence of light.

Although Sir Francis Galton, of England, who may be called the father of eugenics, had already started a movement for the conscious betterment of the human stock, out of these discoveries has arisen the real science of eugenics. They have changed the whole current of thought regarding heredity, and the constancy of its action, as well

as its controlability. They also emphasized the fact that it does make a difference whom one marries, if the character of the resulting offspring is to be considered. Their whole make-up is not subject to the caprice of forces beyond human perception, but is in some degree, subject to control.

Credit is due Professor Thomas Hunt Morgan, of Columbia University, for having added more to our knowledge of the germ cell than any man since Gregor Mendel. His work, together with that of his students, has lifted American experimental biology to a high plane in the scientific world.

MECHANISM OF HEREDITY

The sperm of every species of animal, or plant, carries a definite number of bodies called chromosomes. The egg carries the same number; consequently, when the sperm unites with the egg, the fertilized egg will contain the double number of chromosomes. For each chromosome contributed by the sperm there is a corresponding one contributed by the egg; that is, there are two chromosomes of each kind, which together constitute a pair. Every species of plant and animal has a certain definite number of these chromosomes in all its cells, both body-cells and reproductive cells. The number in some species is only two, while others have as high as two hundred. According to Profesor E. B. Wilson, the veteran biologist, the ox, guinea pig, and onion, each has sixteen chromosomes in each cell; mice, salamanders and trout have twenty-four; monkeys have fifty-four; in the human cells there are forty-eight. Half the chromosomes have come from the mother and the remaining twenty-four from the father. "The chromosomes are the sole bearers of heredity." Each of these tiny particles bears its own particular and indivisible burden of life, as though it had been divinely appointed as the messenger of some Master Builder, who had some purpose of his own hidden beyond human ken. Each cell carries its own burden of life from out of the eternity of the past and hands it on to the greater eternity of the future. The chromosomes of this cell carry, it may be, the life of an ameba; the chromosomes of that cell may bear within them all the mighty genius of a poet, a philosopher, or a king. While they constantly vary and change, from causes and processes of which we know little, yet they are the most indestructible form of matter that we know. They move with all the mechanical precision of the planets; they divide and grow and sort themselves out in mendelian proportions and thus distribute the various characteristics of the ancestry among the descendants. "They are the most important things for their size in the whole world." (Woods.)

It seems necessary to recall to memory that these forty-eight chromosomes in the human being represent very probably the totality of

transmissible qualities which are to be imagined as localized in some way in these little bodies. It is impossible and surpasses the limits of natural science to try a more detailed explanation of this fact. But what is settled as a matter of fact in the general science of heredity is to be applied also to the human organism; furthermore, we have to remember that during the evolution of the whole organism from a single fertilized ovum, a part of every one of these latter enters at the same time into every new cell of the body. The marvelous mitotic cell division provides for the equal distribution of the chromosomal material as the fertilized ovum, from which our body originated. But this chromosomal material represents at the same time the potential power of specific differentiation of the cells, providing innumerable new cells and forming in this way the different parts of our body. The specific structure of the chromosomes with their potential power to bring about quite a specific differentiation of the cells and cell complexes is responsible for the characterization of the species, race, family, sex, and a great deal of the individual peculiarities which are potentially determined and fixed at the moment of fertilization. Every cell of the body receives the same amount of chromosomal material by the mitotic cell division, but the potential power to bring about quite a definite differentiation of the cells with quite definite and specific characteristics has become effective during the developmental process and has been used up to a different degree depending upon the different end state of the cells. We call the great number of different latent characteristics localized somewhere in the chromosomes unit-characters, or mendelian units, as they are transmitted to the descendants according to the rules of Gregor Mendel.

"What we assume to be the material substratum of those units must be present, therefore, in every body cell. The units responsible for the development of a particular body length, of a particular long nose, of musical endowment, or of red hair will be present in every cell of the body, but they will be effective in quite a different way in the different cells. The units for body length will manifest themselves in the cells of epiphyseal cartilages, the units for a long nose in the cells forming later the constituents of the nose, the units for musical talents in certain brain cells and the units for red hair in the cells producing hair pigment. In the remaining cells of the body all these different units remain inactive. Only in the germ cells do they keep their whole latent power undiminished, in order to manifest it when the germ cell happens to meet with a second germ cell of the other sex. We may speak of units as of chromosomal potencies, which are present in every cell, but become active only in a few special cell groups according to the kind of these units. In lower organisms where the power of regeneration is higher, or even complete, the presence of all units in every cell is quite obvious. The chromosomal potency representing the Mendelian units is the highest known, almost incomprehensible store of potential energy."—(Julius Bauer.)

In the higher plants and animals when two cells unite from two parents at an early stage in cell division, a few cells are set aside at

the beginning of each individual's life. These are the reproductive cells. They remain unchanged, set aside in special organs, until the individual comes to maturity, when they begin to multiply and are by sex unison combined with the cell from some other individual and thus a new generation of individuals comes upon the scene. The plant, or animal merely carries these germ cells through life and adds nothing to them in so far as we know, except nourishment, and takes nothing away. It is evident then that heredity, the portion set aside for reproducing the next generations, is one continuous stream. "The body dies, but the germ cells are immortal." The eggs, or germ cells which happen to be in any individual's body when it dies, of course, die with it and decay; but before it has died, if it has any progeny, it has handed on to its offspring a portion of this hereditary material carried in these chromosomes which it did not itself produce, but which it received from its parents, who in turn had received it from his parents back to the primal pair of living things. And so, on and on this stream of germ cells, which is the stream of life itself, flows unbroken throughout the succeeding generations. This stream of germ cells is never broken unless a whole species is wiped away. You ask what is to be done about this? Much is already being done; very much more can be done. I believe we are at least going to get rid of the feebleminded, as it is a perfectly solvable problem. We have assumed that feebleminded children came by divine intent, but they are evidently in the same class as side whiskers, they are just our own cussedness made visible, at least 80 per cent of them.

TREATMENT

Persuasion and education are the great eugenic agencies. Compulsion and legislation are very secondary. Thousands in this country have already been sterilized; consent being obtained mostly by persuasion. By using a lot of common sense with the public and a lot of entreaty with the feebleminded, they have, in California, sterilized nearly 5000 without the law so far having been called in question. I think Judge Olson's idea of segregating the defective children while they are young and caring for them on large farms where they can be kept at the expense of the state for life, thus preventing any damage which they might do, by breeding or otherwise, is a good one. We could by means of segregation of the sexes for the criminally inclined, idiots, feebleminded, epileptics, insane, etc., alone save the blood stream of our race from a tremendous amount of needless contamination. As for the worst types of human defectives, they will probably fail to produce anyway. The ideal way to treat defective children, however, is to start several generations before they are born and prevent their arrival upon the scene, rather than cure, or kill them. Much good can be accomplished by inculcating in our young boys and

girls the higher ideals along eugenic lines, by proper teaching at school, at home and abroad. A further knowledge of heredity in the marriageable young, augments an already developed wisdom in mate choosing. It unconsciously and favorably modifies the individual taste. What the physical, mental and moral caste of the races of the future shall be, depends largely upon the action of those upon the earth at present, who are now making their choice in marriage.

When we propose to restrict marriages, or mating of those unfit to marry, people are apt to say, "That is a dream, it can't be done." But it can be done and it has been done. We all know of the cretin in Switzerland, a kind of idiot, short in stature and afflicted in all cases with goiter, frequently helpless in childhood. A gentleman very much interested in eugenics, visited Aosta, in Italy, just outside Switzerland, once in 1900, and again in 1910. In 1900, he found many of these dwarfs among the beggars in the streets, in the asylums, in the home; but in 1910, he found only one! What had happened? A few resolute, intelligent reformers had changed the entire situation. Isolation institutions, one for the men, the other for the women, were established. In these the best care of the inmates was taken as long as they lived, and such people do not live long. Thus it is possible to apply the laws of heredity as laid down by Mendel in a thoroughly practical way and to get results immediately in one short generation. It seems, and it is, a colossal task to change average human nature one iota. Yet in the light of modern eugenics we could make a new human race in a hundred years, if only people in positions of power and influence would wake up to the paramount importance of what eugenics means.

There are seven main lines along which eugenic improvement of the race may be obtained. (1) Education of all people on the inheritability of traits and the consequent development of higher and more intelligent ideals of marriage. (2) Segregation of defectives, so that they may not mingle their family traits with those on sound lines. (3) Sterilization of certain gross and hopeless defectives, to preclude the propagation of their type. (4) Marriage laws consonant with the principles of eugenics. (5) Selective immigration laws to stop the dumping of European institutions for defectives, delinquents, etc., on America. (6) The abolition of war, which systematically destroys those best fitted to be progenitors of the future human race, young men medically selected as the strongest and soundest. (7) The conversion of "birth control" now acting dysgenically into a eugenic agency to increase the birth rate of the fit and decrease that of the unfit.

"There would seem to be great need of State Eugenic Boards, to correlate and to promote these activities, in the interest of the future population, and to give expert advice as to how to mate wisely." (Fisher and Fisk.) Some people have little faith in what can be ac-

complished by this sort of education, but let us consider the amazing thing that has happened in educating people about another great discovery of science,—the discovery of microbes. The education of the people about microbes is one of the most spectacular things in all history. A generation ago, microbes were just as mysterious to the public as germ cells and chromosomes are today, yet every child knows about microbes today. "They have changed the architecture of our houses, the kind of clothes we wear, the sort of food we eat. They have changed our school books, our morals and habits, even our religion." (Wiggam.) Notwithstanding all this, indeed because of all this, I predict that within another generation we shall see cities and nations setting aside "Germ cell week," "Heredity week," and "Race improvement week." The States of Michigan and Kansas have already approached this in their famous "Fitter Families Contest," at their annual State Fairs. We shall, I think, ere long see even longer processions carrying banners with such inscriptions as: "Insanity, Epilepsy, Pauperism, and Feeblemindedness, are mainly caused by bad germ cells"—"Crime is largely due to bad germ cells"—"Tuberculosis is chiefly caused by unwise marriages"—"Clean up your family germ cells and help produce a better race."

Heredity is man's best friend. Pearson has proved that heredity is five times as important in causing health and disease as microbes, or any environmental factor. Though the public may not be impressed by a study of eugenics in the abstract, teaching the practical side of heredity will obtain its interest. For instance, it is reported that in the past generation all crime in the State of Indiana has come from about one hundred families. In several of our states from one-third to one-half of the taxes go to the care of the unfit. When the average man learns that he is spending an enormous portion of his wages to insure his family against disease, when a wise marriage would have given him this insurance free of charge, he is bound to be impressed.

Finally: The best treatment for the "Developmentally Unfit Infant," is well illustrated in the wonderful play of Maeterlinck's called the "Bluebird," in which we are taken to the "land before birth" where the children are waiting to be born, having selected their parents to be; or like the advice of Oliver Wendell Holmes to children to choose good grandparents.

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NOTE.—As this issue of the Journal is devoted to the Transactions of the Thirty-ninth Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, it was found necessary to omit the current installments of the usual departments. The publication of the latter will be resumed in the May issue.